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ABSTRACT

These hearings before the Senate Select Committee on Nutrition and Human Needs are organized in several parts (See UD 013 650 for Parts 1, 2, and 2A). The purpose of these hearings is to review the quality of advertising now being directed at children, and the health implications of that advertising; as well as what steps can be taken to use television advertising as a force for better nutrition education for the Nation's children. Part 3 has an opening statement by Senator McGovern. Testimony is heard from Dr. Jean Mayer, Professor of Nutrition, Harvard School of Public Health; Dr. Abraham E. Nizel, Assoc. Prof., School of Dental Medicine, Action for Childrens Television; Dr. James H. Shaw, Prof. of Nutrition, Harvard School of Dental Medicine; and Dr. Juan Navia, Senior Scientist, Institute of Dental Research. Part 4 has testimony from Mrs. Peggy Charren, President, and Mrs. Evelyn Sarson, Executive Director, Action for Children's Television (ACT); Mr. Robert Choate, President, Council on Children; Mr. Tracy Westen, Director, Stern Community Law Firm; and Mr. George W. Orr, Exec. V.P., Medical Affairs, Miles Laboratories. Part 5 contains testimony from Mr. Stockton Helffrich, Director, National Assoc. of Broadcasters; Mr. Herminio Traviesas, V.P., NBC; mr. Thomas Swafford, V.P., CBS; Mr. Alfred R. Schneider, V.P., ABC; Mr. Howard H. Bell, Pres., American Advertising Federation. [Five pages (pages 473 to 475, and 478) have been deleted from Part 5 of this document, as they will not reproduce.] (SB)

NUTRITION EDUCATION—1973

HEARINGS

BEFORE THE

SELECT COMMITTEE ON NUTRITION AND HUMAN NEEDS

OF THE

UNITED STATES SENATE

NINETY-THIRD CONGRESS

FIRST SESSION

PART 3—TV ADVERTISING OF FOOD TO CHILDREN

WASHINGTON, D.C., MARCH 5, 1973

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Part 1 and 1A—Overview—Consultants' Recommendations, Dec. 5, 1972; with Appendix.
Part 2 and 2A—Overview—The Federal Programs, Dec. 6, 1972; with Appendix.
Part 3—TV Advertising of Food to Children, March 5, 1973: with Appendix.
Part 4—TV Advertising of Food to Children, March 6, 1973: with Appendix.

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NUTRITION EDUCATION

Television Advertising of Food to Children

MONDAY, MARCH 5, 1973

WITNESSES IN CHRONOLOGICAL ORDER

APPENDIX

OFFICE OF SENATOR GEORGE McGOVERN

SENATE NUTRITION COMMITTEE TO HOLD HEARINGS ON TELEVISION ADVERTISING OF FOOD TO CHILDREN

Senator George McGovern (D-S.D.), Chairman of the U.S. Senate Select Committee on Nutrition and Human Needs, announced today that the Select Committee is resuming its inquiry into the subject of Nutrition Education next week with 3 days of hearings on the subject of the advertising of foods on television to children. The purpose of these hearings is to review the quality of advertising now being directed at children, and the health implications of that advertising, as well as what steps can be taken to use television advertising as a force for better nutrition education for the Nation's children.

The hearings will resume on March 5, 6, and 7[1] in room 1318, Dirksen Building, at 10 a.m. and continue on March 12 and 13. These hearings will include testimony from noted nutritionists, experts in the field of preventive dentistry, consumer advocates, food companies, advertising agencies, representatives of the broadcasting industry, and of the Federal Government.

A COMPLETE LIST OF THE WITNESSES FOLLOW

March 5

Dr. Jean Mayer, Professor of Nutrition, Harvard School of Public Health, Boston, Mass.
Dr. Abraham E. Nizel, DMD, MSD, Associate Professor, School of Dental Medi-
Director, Action for Children's Television (ACT), Newtonville, Mass.
Dr. James H. Shaw, Professor of Nutrition, Harvard School of Dental Medicine, Boston, Mass.
Dr. Juan Navia, Senior Scientist, Institute of Dental Research, University of Alabama, Birmingham, Ala.

March 6

Mrs. Peggy Charren, President; accompanied by Mrs. Evelyn Sarson, Executive Director, Action for Children's Television (ACT), Newtonville, Mass.
Mr. Robert B. Choate, Jr., President, Council on Children, Media and Merchandising, Washington, D.C.
Mr. Tracy A. Westen, Director, Stern Community Law Firm, Washington, D.C.
Mr. George W. Orr, Jr., Executive Vice President; accompanied by Mr. Daniel R. Johnson, Associate Counsel; and Dr. Bruce Semple, Vice President, Medical Affairs, Miles Laboratories, Inc., Elkhart, Ind.

March 7

Mr. Joseph E. Lonning, President and Chief Executive Officer, Kellogg Company; and Mr. William LaMothe, Executive Vice President and Chief Operating Officer, Kellogg Company.
Mr. Leonard S. Matthews, President, Leo Burnett Co., Inc.
Miss Mercedes Bates, Vice President-Director, Betty Crocker Kitchens.
Mr. Stuart B. Upson, President and Chief Executive Officer, Dancer Fitzgerald Sample, Inc.
Mr. Richard Aszling, Vice President, Public Relations/Public Affairs, General Foods Corporation; with Mr. Bernard Kanner of Benton Boyles.
Mr. Edward N. Ney, President and Chief Executive Officer, Young and Rubicam International, Inc.

March 12

Mr. Stockton Helffrich, Director of Code Authority, National Association of Broadcasters.
Mr. Herminio Traviesas, Vice President, Broadcast Standards, NBC.
Mr. Thomas Swafford, Vice President of Program Practices, CBS.
Mr. Alfred R. Schneider, Vice President, ABC.
Mr. Howard H. Bell, President, American Advertising Federation.

March 13

Mr. Clay Whitehead, White House Office of Telecommunications.
Hon. Lewis A. Engman, Chairman, Federal Trade Commission.
Hon. Dean Burch, Chairman, Federal Communications Commission; and Hon. Nicholas Johnson, Commissioner, FCC.

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[1] See Senator McGovern's statement on p. 256.

NUTRITION EDUCATION

Television Advertising of Food to Children

MONDAY, MARCH 5, 1973

U.S. SENATE
SELECT COMMITTEE ON
NUTRITION AND HUMAN NEEDS
Washington, D.C.

The Select Committee met at 10:15 a.m., pursuant to call, in room 1318 of the Dirksen Building; the Honorable George McGovern, chairman of the committee, presiding.

Present: Senators McGovern, Percy, and Schweiker.

Staff members: Kenneth Schlossberg, staff director; Vernon M. Geetchens, senior minority professional staff; Elizabeth P. Hottell, minority professional staff.

Senator McGOVERN. The committee will come to order.

OPENING STATEMENT BY SENATOR McGOVERN, CHAIRMAN

Senator McGOVERN. The Select Committee on Nutrition and Human Needs is today continuing an inquiry regarding the nutritional health and well-being of the American people fully as important as, I think, its investigations over the past several years into the problem of malnutrition from lack of adequate food. There is increasing concern, evidenced by professionals and laymen alike, about the quality of the American diet. Both Department of Agriculture surveys as well as the Ten-State Nutrition Survey by the Department of Health, Education, and Welfare, indicate a disturbing decline in some very important parts of the traditional American diet. This decline is accompanied, on the other hand, by a striking increase in the consumption of an array of nontraditional kinds of snack foods.

This committee has heard testimony from experts in the field of nutrition education that the potential costs, potential health costs of nutritional ignorance may be amounting to billions of dollars. These experts have emphasized to the committee the critical role that proper nutrition education can and must—play as part of a total national preventive health policy. They have further emphasized the responsibilities that government schools and private industry must play in both developing and implementing this policy.

In its investigation of this issue, the committee has become aware of the special importance that TV now plays in influencing the Nation's nutritional habits. The TV advertising of food products now exerts an enormous new influence on the Nation's children. The committee has been told that moderate TV viewing by children today amounts to 5,000 commercials a year and, theoretically, 80,000 com-

mercials by the time a child reaches the age of 16. A heavy proportion of these commercials deal with food products and predominately with breakfast and snack products. The committee scheduled these hearings because it believed it had a special responsibility to investigate this area and because it believed that the companies and advertising agencies, involved in this area, had a responsibility to review their practices and policies in relation to the types of nutrition education messages that they are getting across to children.

It was for that reason specifically, the committee invited the major manufacturers of children's cereals, and their advertising agencies for those cereals, to testify before us on this coming Wednesday.[1] After initially indicating a willingness to testify, the companies and the advertising agencies notified the committee that they respectfully declined to testify because of the nature of the hearings—that is, because of the scope of the nutrition health questions being raised. They took the position that the subject of the hearings conflicted with a complaint issued against the companies by the Federal Trade Commission.

I have asked the committee staff and counsel to the committee to review that position.[2] After examining the nature of the FTC complaint, the staff advises me that the FTC complaint focusing on questions of restraint of trade and monopoly power bear only the most indirect relationship to the basic kinds of nutrition education, health, and diet questions which are the subject of this committee's investigation.

I cannot, therefore, accept the refusal of the companies and the advertising agencies to appear before this committee. I believe they have a duty and a responsibility to come forward and provide the committee with the best information and testimony possible. I intend to convene, at the earliest possible moment, an executive session of the committee so that the members may decide what further steps they wish to take to insure that this committee's inquiry can proceed as planned. I'm very hopeful that the companies and advertising agencies will reconsider their position and that we may reschedule their appearances before this committee at the earliest possible date.

This morning, our leadoff witness is Dr. Jean Mayer, of the School of Public Health, Harvard University; former chairman, White House Conference on Food, Nutrition and Health. He has been before this committee on several occasions. If my memory is right, Dr. Mayer, you were the first witness to appear before this committee when it began its deliberations in December 1968.[3] We are delighted to have you back. We are always interested in what you have to say.

STATEMENT OF DR. JEAN MAYER, PROFESSOR OF NUTRITION, HARVARD SCHOOL OF PUBLIC HEALTH, BOSTON, MASS.

Dr. MAYER. Thank you, Senator. Mr. Chairman, ladies and gentlemen. I think the importance of advertising and nutrition is perhaps best illustrated by the fact that a health-oriented magazine undertook

[1] See hearings announcement, p. iv.
[2] See Appendix, pp. 307–15.
[3] See U. S. Senate Select Committee on Nutrition and Human Needs, Part 1—Problems and Prospects, hearing of Tuesday, Dec. 17, 1968; pp. 11–41.

to sponsor a contest on nutritional advertising. This idea was received with enough favor by the nutrition community that the contest—which is now going to be administered by the Society for Nutrition Education—is judged by officially designated members of the American Institute of Nutrition, American Dietetic Association, American Home Economics Association, as well as by representatives of consumer groups and the advertising industry.

The reason the nutrition organizations did take the problem of advertising so seriously is because we already know that it has an enormous influence on the feeding habits of the Nation. At a time when contagious diseases have receded as the major threat to the health of Americans and such diseases as cardiovascular disease, diabetes, obesity, and dental decay emerge as the chief threats to the health of the Nation—together with cancer—the importance of nutrition is more and more evident.

Now, it's quite obvious that the food industry itself believes that advertising is a very potent factor in molding food habits. on't have overall figures available, but "Advertising Age" every year, I think, publishes in August, a list of the largest advertisers. It becomes quite obvious, perusing this list, that the food industry is a very heavy advertiser. A single company spent, in 1971, as much as $160 million. Soft drink companies are also very large advertisers with expenditures, which I see, being in the order of $200 million per year.

Advertising to small children is an important component of such advertising. Any father or mother who has watched Saturday morning television to see what the children are exposed to can't help but notice that advertising goes on at a very much higher frequency than in adult programs. Also, for that matter, that the advertisements are prepared with much more care and much more artistry than the programs themselves. The chairman has already noted that the best estimates—arrived on the basis of surveys such as the Carnegie Foundation Survey—is that the average American child may be exposed to as much as 5,000 food advertisements a year.

Companies Have Ability To Create Good Commercials

Now, advertising is a morally neutral technique. There are many examples where it can be found to play a beneficial role. For instance, the ads which were judged worthy of recognition by the Family Health Nutritional Advertising contest judges were, in fact, highly educational and artistic creations. It's interesting, Mr. Chairman, that one of the ads crowned by the committee was an ad produced by one of the companies which we learned this morning will not be present to testify; this shows that large food companies are certainly well able—if they so choose—to produce informative and educational ads.

On the other hand, I think it is very difficult to escape the conclusion that, viewed as a whole, the advertising of food is playing a deleterious role in the nutrition of the American people. It's also very difficult to escape the view that many of the children's food advertisements are really nothing short of nutritional disasters. I think perhaps the best way to judge the effect of advertising is to see where the advertising dollars go.

Food Classed in Decreasing Usefulness

I think it's legitimate to try to classify foods in perhaps four groups of decreasing usefulness:

Group One would have fruits and vegetables and would have animal products such as milk, fish, eggs, meat and cheese.

Group Two would have such useful foods as bread, potatoes, macaroni products, some of the better breakfast cereals, soups, particularly the better ones.

Group Three, and we are beginning to go down considerably, would have such foods as the sugar-coated breakfast cereals, most of the snack foods, many of the cake mixes.

Finally, Group Four, the empty calories group, would have candy and soft drinks and, at the chance of being thought guilty of a horrible pun, we might perhaps have alcoholic beverages as a fifth group.

Advertising in Reverse Order of Usefulness

Now, it's fairly obvious to any even casual television viewer that national advertising expenditures are in reverse order to the usefulness of the foods. Group one, the fruits and vegetables and such things as fish, eggs, and meat, receive very little advertising. Advertising for potatoes, macaroni and so on is also very limited.

By contrast, if you go to soft drinks, alcoholic beverages and so on, advertising is an extraordinarily large item. Now, I do not subscribe to a "devil theory" of advertising. I could not think that the advertising profession is made up of people who have set out to deliberately pervert the food habits of the American population; but the effect, in many cases, is just the same. I think the reason for this is fairly plain. The foods in group one—the foods produced by farmers, basically, and which are consumed almost directly by the population—are not branded. They are produced by a very large number of farmers who don't have any advertising resources at their disposal.

By contrast, foods in group three and group four are produced by a very small number of manufacturers who have very well established brands of snack foods, candy and soft drinks, and who have enormous resources available for advertising. So that we end up with the fact that the structure of our food industry—in spite of the undeniable good will and excellent intentions of many of its leaders; which if you remember, Mr. Chairman, resulted in a very strong endorsement by leaders of the food industry of the concept of nutritional education at the White House Conference. In spite of all this, the structure of the industry and advertising industry end up with the whole weight of enormous resources of advertising going far toward the destruction of our food habits.

Cardiovascular Disease Main Health Problem

I may add that even within each group the same phenomenon is visible. I would like to make a very strong point of my belief that good breakfast cereals are an extremely useful food. At a time when cardiovascular disease is our number one food problem or health problem, and we are trying to reduce the fat intake of our population, the consumption of good breakfast cereals with a small amount of sugar and a large amount of milk--skim milk if necessary—is an excellent

way for people to get a good breakfast and reduce their intake of fat.

Unfortunately, what is being propounded to children is extremely heavily coated cereals with a great deal of sugar. Many of which, mothers assure me, are consumed without milk and which cannot, even if they are enriched with a few vitamins, be considered as good foods. In fact, I have some very serious questions as to whether the Federal Trade Commission should, in fact, tolerate the fact that some products which have more than 50-percent sugar should be called cereals. I think they perhaps might more properly be called candy.

The promotion of high-fat and high-salt snacks to adults is also an effect of concern because of cardiovascular risks. The promotion of high-sugar snacks and soft drinks is a danger for children, as well as for adults, but to children in particular because of the effect on dental care which some of my colleagues will speak about later today.

Mr. Chairman, I think we have always accepted, in this country, the idea that the community at large are the trustees for the children's health. It's on that basis that we have always agreed that compulsory vaccination was something which ought to take place in schools. It seems to me that—at the time when some of our main danger is cardiovascular and dental diseases—the community, similarly, has a special duty as regards children. I believe that this ought to express itself by regulations—self-regulation if possible, imposed regulation if necessary—on health and nutrition information, and health and nutrition advertising as it applies to small children.

There already is a precedent by some of the nutritional supplement companies going out of advertising to small children by replacing the advertising with institutionally-sponsored nutrition messages. I would hope that large food companies would similarly exercise the same restraints by stopping advertising to small children. Stop making small children, in effect, agents in an unconscious blackmail plot against their parents of what they are going to buy at the supermarkets or else the child is going to throw a tantrum. Generally speaking, they should work with professionals to improve the nutrition habits of small children rather than—as is very much the case at this point—help debase them.

PREPARED STATEMENT OF DR. JEAN MAYER

It is obvious from the resources used that the food industry believes that advertising is a potent factor in molding food habits. While no overall figures are easily available, it is highly likely that the food advertising expenditures of the Nation total well over $2 billion; according to Advertising Age (August 1972), one company alone spent $160 million on advertising. Soft drink manufacturers account for additional advertising expenditures of the order of $200 million per year. Advertising to small children is an important component of such advertising: On Saturday morning television, it goes on at a much higher frequency than during adult programs, with advertisements obviously prepared with more care and artistry than the programs themselves. It has been estimated on the basis of foundation-sponsored surveys that preschool children may watch up to 25,000 advertisements a year, at least 5,000 of which are food advertisements.

Advertising is a morally neutral technique. Many examples can be found where it plays a beneficial role, and many examples can be found where the effect on the "viewer" is deleterious. Unfortunately, on the whole, food advertising as presently practiced in our country seems to work against the nutritional health of the American people; many children's food advertisements are nothing short of national disaster.

Consider where the bulk of the advertising dollars go. If you placed foods in decreasing order of nutritional usefulness, you would have something like this:

Group 1: Fruits and vegetables; milk, fish, eggs, meat and cheese.
Group 2: Bread, potatoes, macaroni products, some of the better breakfast cereals, soups.
Group 3: Sugar-coated breakfast cereals, most "snack foods," cake mixes.
Group 4: Candy and soft drinks (alcoholic beverages could be thought of as a fifth group).

It is fairly obvious to any habitual television viewer that national advertising expenditures are in reverse order to nutritional usefulness. I do not subscribe to a "devil theory" of advertising; by no means do I think that advertisers set out to deliberately pervert the food habits of the U.S. population, but the effect is there all the same. The reason for this is plain: Foods in group 1 are not branded, and are produced by an enormous number of farmers with no advertising resources (except through local supermarket advertising). Foods in groups 3 and particularly 4 are produced by a few companies with strong brands to introduce or protect and with large advertising budgets. The structure of the industry, in spite of the undeniable goodwill and excellent intentions of many industry leaders, dictates the results.

It may be observed that unlike the situation in other consumer areas, advertising, even if produced in the billions of dollars, cannot increase overall food consumption. This is regulated by the physiological mechanism of the individuals who comprise our population. What advertising does is to shift consumption from one category of foods to another; at present all too often from better foods to less nutritious foods.

The debasement of the food supply through advertising unfortunately is often true within groups. Let me make it clear that I think that some of the older established cereals—hot cereals in particular, but many others as well—are excellent foods, the consumption of which should be encouraged for both children and adults. In particular, at a time when cardiovascular diseases are a major threat to the health of the Nation, such cereals, consumed if need be with low fat milk, are an excellent breakfast replacement for high-cholesteral foods. Unfortunately, those cereals most heavily advertised to children are sugar-coated cereals (a number of which contain over 50 percent sugar and therefore ought not to be properly called cereals). According to the testimony of many young mothers, these are often eaten like candy, without milk. In spite of their being enriched with some vitamins and iron, the total effect is one of inadequate nutrition (deficient, in particular, in trace minerals—there are suggestions that zinc deficiency may be appearing among U.S. children, including middle and upper socioeconomic class children; chromium deficiency may be a factor among the elderly).

The promotion of high fat, high salt snacks to adults compounds cardiovascular risks. The promotion of high sugar cereals, snacks and soft drinks to children is a dental disaster, and may be a factor in increasing the likelihood of diabetes in genetically vulnerable subjects; for the past 2 years consumption of sugar and corn syrup has exceeded our flour consumption—with unpredictable results for the health of the country.

Irresponsible advertising policies by large companies who ought to know better have undeniably helped to produce an atmosphere of distrust toward the national food supply. In this environment, purveyors of all sorts of faddist products, sold at enormous and totally unjustified prices, thrive on extravagant claims.

It is to be hoped that the Congress will see fit to recognize that food, like drugs, is not a commodity like other consumer goods. Because of its relation to health, at least its advertising specifically to small children should be regulated or eliminated. It makes little sense to encourage nutrition education where the battle has already been lost by the time the 6-year-old enters school.

Why not restrict food advertising to adult programs and encourage food companies instead to conciliate parents by sponsoring—on an institutional, nondirected basis—better children's television programs, recreational as well as educational, than are available now. There are some encouraging examples of this new trend; it should be vigorously promoted.

Finally, we can hope that the introduction of nutrition labeling will convince food companies and advertisers that you can "sell" nutrition—thus giving an advantage to the more nutritious foods and reversing the present unfavorable trend. We can also hope that fruit and vegetable growers, producers of more nutritious products hitherto hardly advertised (fish jumps to my mind as an

example) will see their interest in banding together to produce attractive nutrition-based advertising which will inform the public at the same time as they promote superior foods.

Thank you, Mr. Chairman.

"Advertising . . . A National Disaster"

Senator McGovern. Thank you, Dr. Mayer.

You say, in your prepared testimony, that the advertising, especially of children's food today, as presently being handled is in some respects a national disaster. Could you elaborate on that statement? That's a very strong statement. I wonder if you could just elaborate on it a little as to what you mean.

Dr. Mayer. Mr. Chairman, I am not a specialist in the education of small children. I have had five children, I have observed the results of many things on them but that is hardly a professional competence. I bow to the opinion of all my colleagues in that field, that influences before the children go to school are extraordinarily important.

As you know, Mr. Chairman, I have appeared before this committee about the importance of having better nutrition education programs in schools using the School Lunch Program as a way of education as well as a way of nutrition. However, I am very much afraid that, even with a vigorous nutrition education program, we might be locking the barn after the horse has been stolen.

TV Exposure on Primary 6 Years

Before the first 6 years of their lives children have been exposed to very striking lessons. I think television is a very striking phenomenon for small children, equating goodness with sweetness, selling food on the basis of anything except nutrition, on the basis of the fact that it is sweet, that the box is attractive, that you can get a green monster if you buy this or that cereal. It becomes very difficult, all of a sudden at the age of 6, to revert the whole process and explain to them that the first reason we eat is to get the necessary nutrients.

Senator McGovern. The thrust of what you are saying is that even if we had good nutrition education programs in the elementary and secondary schools, at that point it would probably be too late to compete with the heavy impact that television advertising has had on food habits?

Dr. Mayer. Well, I would rather have the children either already preeducated, or at least a virgin mind as regards nutrition, rather than already having been manipulated to sell them foods which, in effect, are not the best foods they could consume.

Senator McGovern. Dr. Mayer, do you recall the recent controversy regarding the advertising of sugared vitamins, the complaints that were made to the FTC on that? If I understand the situation, there were complaints to the FTC that it was inappropriate and unwise to teach children to eat vitamin pills as they would candy. What is the reason for that? Are there bad side effects from excessive use of vitamins or what was the reason for the complaint?

Dr. Mayer. Well, I think that one of the things that our contemporaries need to be reminded of is that we certainly need, every day, a proper supply of vitamins coming from foods in order to survive

and be healthy. There is some sense, perhaps as an insurance, particularly for people with irregular habits or extraordinarily large needs because of pregnancy or nursing or small food intake because they are trying to cut down their weight while remaining very inactive to have a supplement representing the recommended dietary allowance if they so choose. There is certainly no justification for having enormous doses and particularly capricious doses of various vitamins ingested day after day.

Inherent Dangers in Vitamin D

In the case of supplementary vitamins, particularly vitamin D, there is indeed a risk of too much vitamin D being consumed—which in the case of children may end with a growth retardation. If there is no vitamin D in the diet you may get rickets. Too much vitamin D in the diet, you may stop growing. Certainly, having nutritional foods which are consumed more or less like candy and are very attractive because of all that sweetness. Also many are extraordinarily heavily fortified—this is not the way to end up with a rational vitamin intake and rational intake for children.

Senator McGovern. Can you tell us what the Food and Drug Administration regulations are—that is, the recent rules that they have laid down with regard to vitamin content for foods and dietary supplements and drugs?

As I understand they spelled out certain percentages that will enable us to define what are vitamins, what are dietary supplements, and at what level they become drugs.

Dr. Mayer. As I remember it, Mr. Chairman, as an ordinary food, a breakfast food may have up to 50 percent of the recommended dietary allowance per day in a portion. I think between 50 and 150 percent is considered a special dietary supplement and over 150 percent it becomes, in effect, an over-the-counter drug—or ought to be—because it is beyond the point of special dietary supplement.

How Do New FDA Regulations Class Products?

Senator McGovern. Well, the staff has drawn my attention to a product here, a cereal product that is called "King Vitamin," and the advertising says that it meets 100 percent of the needs, the daily requirements of various types of vitamins.

How would that product be classified under these new regulations? Is it a vitamin, or a dietary supplement, or a drug—or how does it fit the new FDA regulations?

Dr. Mayer. I think it would be a special dietary supplement. I am unhappy about this oversell horsepower race. I think that if you have an adolescent, particularly who eats three or four portions in the course of a day and then takes a couple of "vitamins," you may end up with children who are grossly overdosing themselves with vitamins. This is particularly objectionable in the case of vitamin D.

There is also a point which needs to be made very strongly. Vitamins are an extremely important component of our diet but so are other components. For instance, trace minerals. Cereals, some of which are extremely highly processed so that their intrinsic nutrient content is very low, particularly when combined with sugar, which is the proto-

type of "empty calories," are not a complete food even if fortified with eight or 10 vitamins.

There was at least one very disturbing paper last summer presented before the International Nutrition Congress in Mexico City by three Denver pediatricians—the senior author was Dr. Hartridge—suggesting very strongly that zinc deficiency was something which was appearing in their private patients among middle-class and upper-class children. This seems like an extraordinary occurrence. This, incidentally, led the children not to grow and not to develop. The children were very, very small; but they grew when given zinc supplements. Zinc is a very widespread metal in nature and it seems almost impossible that American children of well-off families would be deficient in zinc. However, it becomes possible when you think of children feeding themselves a cereal containing more than 50-percent sugar, enormous amounts of soft drinks, enormous amounts of snacks and, generally speaking, empty calories. I believe it is important to realize that—much as I am in favor of enriching cereals with reasonable amounts of vitamins and some nutrients—this does not, by itself, mean that the parents have to stop worrying about giving children a well-balanced diet. This should include a reasonable amount of those primary foods which come from the farmer to the family essentially unprocessed. I must say I have some difficulty in understanding why the Department of Agriculture—which as we know has always considered that the welfare of the American farmer was its primary responsibility—hasn't really made a more vigorous effort to defend the consumption of fruits, of vegetables, and of, generally speaking, reasonable unprocessed agricultural foods.

Senator McGovern. That was going to be my next question, Dr. Mayer. As I understand your testimony you said that because of the corporate nature of the industry, the economics of the industry, there is heavily concentrated economic power in those industries that handle these fancy new cereals and fortified foods but there is not similar economic resources available to the producers of the more traditional wholesome type foods. They don't have the big advertising budgets or resources to do that. So isn't there a serious economic problem here?

Agricultural Foods Need Promoting

Dr. Mayer. Well, Mr. Chairman. I think that it really would be a great service to the Nation, as well as to themselves, if producers of fruits and vegetables, producers of fish, producers of many of those commodities which are not consumed in sufficient amounts, could band together and have a much more vigorous campaign. Not product-oriented, as such, or brand-oriented, but promoting various types of foods, various types of vegetables, various types of reasonably processed or not over-processed cereals, increasing the fish consumption, increasing the cheese consumption and so on.

I think it is extremely important that the defense of agricultural products really be mounted. Otherwise, we are going to have a food entirely consumed, made of over-processed foods which are not by themselves necessarily toxic in any way, shape or manner, but which become dangerous if they become too large a proportion of the diet.

Senator McGovern. I take it on that basis that a product like this

called "Flintstones"—it's a vitamin pill that was marketed on television for some time—virtually is candy. There are pictures of it saying it is chewable. It is marketed in little pieces of brightly colored substance that looks like a piece of candy. Because of the complaints to the Federal Trade Commission the companies voluntarily quit advertising children's vitamins.

Now, if in fact this product—which is supposed to be a cereal—contains 100 percent of the daily requirements an adult needs for vitamins and it was thought inappropriate to advertise this product on television, why would not the same standard prevail here? Isn't it equally questionable whether we like to stress cereal for children that is really a concentrated vitamin?

"Advertising to Small Children Is an Outrage"

Dr. Mayer. Mr. Chairman, I not only agree with that, I in general think that advertising to small children is an outrage. I think children under 6—children who are too young to go to school—are also too young to appraise the various factors, certainly particularly concerning their health, and ought not to be asked to make decisions on buying through advertisements directed at them.

I think it should much more properly be directed at the parents of the children who presumably have the judgment to decide whether they want or do not want to buy those products.

Senator McGovern. I suppose one alternative would be to take the heavy vitamin fortification out of the product but what do you have left then in the way of food value?

Dr. Mayer. Well, I think, again, that the curious thing is that some of the best cereals ever devised were the older cereals of the sort of oats and wheat, hot cereals of our childhood. Those are excellent foods which were rich resources not only of good protein but also of vitamins and trace minerals. I think I am going to be extremely unpopular by making this statement, Mr. Chairman, but I don't think it's too much work to require of the mothers of the Nation to get up 10 minutes earlier and have some warm cereals for their children instead of serving those sugar-coated nothings to their children before they go to school. I think cereals are good food but I think the better cereals are the ones I would like to see consumed. Sugar-coated novelties are too often empty calories with, as I say, some vitamins thrown in.

Senator McGovern. Well, maybe you would be less criticized, Dr. Mayer, to suggest that once in a while the fathers get up a little earlier to help out there.

Dr. Mayer. Mr. Chairman, I plead guilty of sexism. I will get up tomorrow morning and cook oatmeal for the family.

Senator McGovern. Just one other question. Then I want to yield to Senator Percy, who has had a great interest in this field.

Previous testimony before the committee recommended that a rather detailed extensive program of nutrition education should be developed for elementary and secondary education.[1]

Would you say—in terms of the way this committee ought to proceed or the way we ought to move in terms of trying to develop a national nutritional policy—that because of the enormous influence the mass

[1] See Part 72/NE1—Consultants' Recommendations, pp. 8–9.

media has on children and on parents, perhaps the place to begin to work is with the food companies and their advertising agencies to try to develop a more responsible advertising campaign. And, also to back it up with substantive products that are nutritionally sound? In other words, instead of trying to use all these synthetic products and heavily processed foods which are then fortified heavily with vitamins to levels that go beyond the needs of children, we ought to concentrate on trying to get industry and their advertising council to take the lead in the formation of a more intelligent nutrition education program?

Dr. MAYER. Mr. Chairman, I think this is certainly entirely desirable. I think we'll go very much faster and I think it will be done in a way that we all like better to do it by enlisting the voluntary cooperation of the food companies and the advertising companies than to do it by coercion.

I think that the introduction of nutritional labeling is a new element in the nutrition picture and I would hope that it would dispel—once and for all—the oft-repeated statement by the advertising companies that "you cannot sell nutrition." I have always thought this was wrong. Mothers, after all—and I think we have to recognize that it is the mothers—who do the bulk of the shopping in the Nation, do it for their families. They have always been concerned with nutrition and are extremely concerned with nutrition now—especially with the great availability of snacks and so on. They feel they are losing some of the control on nutrition of their children.

Nutritional labeling will mean that on every package, hopefully, of food and perhaps on posters at the produce counter, the availability of nutrient information will be present to remind everybody of the importance of nutrition. Nutritional advertising should reinforce nutritional labeling.

Nutritional labeling, incidentally, is easier to launch immediately for the packaged foods where the nutrients are added than it is for the natural foods where there are fluctuations in the amount of nutrients in food but I certainly think it is just as important if not even more important to label natural foods than it is to label highly processed foods. One would hope that the food companies will pick up in their advertisements the most important element in the labeling, the most characteristic elements in the nutritional label and use it to "sell" the food.

PRIMARILY SELL SOURCES OF NUTRIENTS

In other words, what we need is to have the food companies agree that certainly they are selling taste, they are selling appearance, they may be selling fashion, but first of all they are selling sources of nutrients and one is by no means exclusive of the other. In fact, I think it may well be stated that better cooks have not only more palatable foods but more nutritious foods.

Senator MCGOVERN. There is a story, a lead story in today's issue of the "Advertising Age"—which is the national newspaper of marketing—in which the cereal makers say that these nutrition hearings are rigged and that is why they won't appear. It's a story that appears over the byline of Stanley Cohen. The gist of the article is that they would have been willing to come if they had been able to tell the

good things they have done in the field of nutrition education as well as some of the problems.

I want to make it clear that the committee wants to hear about the constructive things that have been done by cereal manufacturers and by other food industry leaders. We have no insistence simply on hearing the dark side of the story, but we did expect to hear other witnesses on this.

Now, I think that one clue in here, the article says, "But one cereal industry representative candidly admitted a major consideration is that the industry simply does not have persuasive answers on sugar on children's TV." I suspect that is the problem. That there really isn't very much defense for marketing products to children in the name of cereals that may contain 50-percent sugar. I think your point is well taken that these products may be mislabeled or more correctly called candy vitamins than cereals. But I do want to make it clear that this committee would like to hear the positive side of what the industry has done in the field of nutrition education. I'm sure some of the things they have done are very impressive.

Dr. MAYER. Could I make a statement on this?

Senator MCGOVERN. Certainly.

Dr. MAYER. I think there are some very good things that can be said about cereals just as there are some bad things that can be said about certain cereals. There are also good things that can be said about the cereal industry and what it has done.

TV Advertisements "Push" Least Useful Foods

For example, it is obvious they have pioneered in listing their components on the boxes and in trying to present nutritional information. It is also true that some of the ads have been very good. For instance, as I pointed out, the Kellogg ad—for what is, in effect, a very superior product—did win one of the entries in that contest. I know, also, some companies like Quaker Oats have had nutrition education campaigns, in that case in Chicago. And certainly Kellogg, General Foods, and General Mills have sponsored some very useful nutrition research. There are thus some very good things that can be said about them. But there is also the problem that, as far as children's cereals are concerned, the advertisements have systematically pushed those cereals that nutritionists and dentists would feel are the least useful of the foods and products on the market.

Senator MCGOVERN. Well, we appreciate your testimony, Dr. Mayer, and I am glad that that last point was made. This committee is not involved in these hearings for the purpose of overlooking what has been constructive and the efforts that have been made. I think it's good to commend the industry on those steps that they have taken and the money they have budgeted in the field of nutrition education has been worthwhile. What we are trying to do is to get at those areas where improvements can be made.

Senator Percy?

Senator PERCY. Thank you, Mr. Chairman. I'm sorry that I could not be here at the outset of the hearing but I was having a private breakfast with Mr. George Meany, talking about food prices among other things. It took a little longer than either of us thought.

I am happy to note that today marks the beginning of the National Nutrition Week as declared by the American Dietetic Association. I think it is very appropriate, then, that at the beginning of such a week we are having these hearings.

I have a short statement, Mr. Chairman, I'd like to make in lieu of not having been here at the opening of the hearing.

STATEMENT OF SENATOR PERCY

Senator PERCY. I am pleased to join our chairman in welcoming the witnesses this morning to the Select Committee on Nutrition and Human Needs as it continues its study of Nutrition Education. For quite some time I have felt that this subject was a key one for our committee to explore, if we had any hope of achieving the goal of eliminating hunger and malnutrition in the United States. I have repeatedly urged the committee to organize hearings on all aspects of nutrition education and deeply regret I was out of the country when these hearings were launched last December. My feeling for the need of these hearings goes back to testimony given by Margaret Mead [1] before this committee several years ago when she indicated that in all fields of human knowledge we have tended to progress through the years; but, in her judgment, nutrition education is one field in which we have regressed. We know less about it—as a people, today—than we did at World War II when we were very conscious of nutrition education. We were trying to gain as much benefit from our food, which was under ration, as we possibly could; but since then we have not paid the kind of attention to it we should have.

Today we are focusing on the place of television advertising in nutrition. As I reviewed the December hearing [2] I was struck by the way in which television advertising has such a very great potential, for both good and evil, effect on the eating habits of all Americans, particularly children. It is time we begin to look into these matters by examining the contents of nutrition advertising aimed at children which appears on television.

These hearings provide us with the opportunity to pursue several important questions whose answers may be none too obvious.

What effect does television advertising actually have on the eating habits of children?

Should television be used to teach good nutrition to children and if so, how?

What responsibility, if any, do food companies and their advertising agencies have in teaching nutrition to children?

What, in fact, is the track record of our leading food companies in informing children about proper nutrition?

We must not overlook the fact that literally hundreds of different foods and food products are advertised on television. We must avoid singling out one segment of the food industry for praise or blame when other segments may be engaged in the same practices. But, let us also understand at the outset that we are here as advocates of good nutrition, and that we want to encourage good nutrition among our chil-

[1] See U.S. Senate Select Committee on Nutrition and Human Needs, Part 1—Problems and Prospects, hearing of Dec. 19, 1968, pp. 151–182.
[2] See Parts 72/NE1 and NE2 with Appendixes.

dren in the most creative, most imaginative, and most effective possible ways.

I, for instance, do not want my three grandchildren to be beguiled by television into developing bad nutrition habits. I want this powerful communications tool to work for their benefit. I assume that executives of food companies who have grandchildren or children feel exactly the same way; and consistent with that, that they will want to provide programs of as high a quality offering as much information of a useful nature to their listening public as they possibly can in addition to selling their product. How do we accomplish this? This is really why we are here.

Our chairman has indicated an article that appeared this morning in the "Advertising Age" and I ask, at this point, unanimous consent that the entire article be placed in the record.[1]

Senator McGovern. Without objection, so ordered.

Senator Percy. I was disturbed at the headlines that cereal makers do feel these hearings are rigged. I can assure the food industry that I, for one, would not participate in rigged hearings.

In researching back as to how these hearings came about, I find that it really goes back to an executive session of this committee held January 29, in which Senator Humphrey requested that the hearings be organized. I don't think he'd mind my stating that he noted at that time that the Kellogg Company had announced that it was developing a series of network television commercials aimed at promoting good nutrition among children.

Senator Humphrey thought it worthwhile to publicize this initiative and find out what similar companies were planning along these lines. I'm sure he felt it best to encourage and to provide publicity to what the industry is doing of a very positive nature.

Our chairman quoted from an article, and I notice a paragraph immediately following the one he read. The same person who admitted that they were short on some answers and would have to come up with them said, "Our track record is enormous, in terms of nutritional education innovations in TV, on packages, and in literature which we are offering to the public," he said, "and we are going to see that Senators get this information, in information kits, and perhaps in statements which we will submit for the record."

The General Mills Company has issued a statement dated today that starts out, "General Mills has long been and continues to be very interested in being active and helping to educate its consumers especially in the area of nutrition. . . . into cereal advertising and promotional activities," and, Mr. Chairman, I ask unanimous consent that the balance of this statement be incorporated into the record. It was just handed to me. I have not read it. I assume it is favorable to the industry or we would not have been given it, but I think it should be included in the record [1] in its entirety.

Senator McGovern. Without objection, so ordered.

Senator Percy. I would just like to say in closing the statement that I would hope that the cereal industry would agree to appear before this committee. I can assure them that the members of the United States Senate are in no sense prejudging any particular industry.

[1] See Appendix, pp. 318–21.

Sometimes we just have to call the shots as they come; but the whole process of having public inquiry in matters that involve public welfare has been so proven through the years that to avoid the testimony would not be in the best interests of the United States and the work of the United States Senate. I don't think declining to appear is really in the vested interest of the industry, so I do hope they will come forward feeling that they will have a fair hearing and feeling that these hearings are not rigged. I can assure them I would not participate in any kind of rigged hearings. We are anxious to hear but I think the industry also will benefit from these hearings and perhaps we can find a way to move forward with a better program.

Dr. Mayer, if I could just ask a few questions of you. In your prepared statement you state, "What advertising does is to shift consumption from one category of foods to another; at present, all too often from better foods to less nutritious foods."

Suppose we were to ban all food commercials on television, particularly children's television. Would this result in better nutrition for children? In other words, in the absence of advertising would children shift consumption from less nutrition to better food or must we take other constructive steps to achieve these goals?

Let Children's Mothers Direct Nutrition

Dr. Mayer. Senator, the fact is that you and I and everyone else in the United States is going to eat whether we watch television or not; the total amount of food consumed is really not a function of advertising. It means that food is really a commodity very different from other commodities because, by and large, other advertisements try to increase consumption of something, automobiles, venetian blinds, appliances, or what have you.

In the case of food, our need for food is set by our own physiological mechanism and the question is not "How much food will we eat?" but, "How much *of what* food will we eat?" The total amount being set by our general appetite.

There is very little doubt in my mind that I would rather have the nutrition of small children directed by their mothers than by the television box. Reluctantly—because I think that the television certainly is a great tool of education, if properly used—my answer is: "Yes, I think small children would be better off if there was no food advertising directed at them."

Senator Percy. Let's just assume a lot of people have a propensity against eating breakfast. I happen to think breakfast is probably the best meal to give you a charge and start. But a great many people simply avoid breakfast.

Let's assume that the food industry has that; through research knows that. Their job is to sell more cereal. We know there is nutrition in rice, wheat, corn, and other products that cereals are made of, including oats. They decide that the best way is to entice children through a sweetener and that children will go for sweets.

Is this justified, in your judgment, considering that they have the job of selling their basic product? They know nutrition is in them, but they have to get the children to eat them. I am putting myself in their shoes. What is wrong with that? Their end goal and objective

is wise and they feel through promotional advertising they are going to overcome the reluctance to start the day with a good bowl of cereal and a lot of milk on it and thus help children start out with a nutritional meal rather than an empty stomach.

Dr. MAYER. Senator, I'm sure you and your wife have had that experience, too. If a child is not hungry in the morning it is just not going to eat. I think that it is perfectly true that children cannot go through a whole morning, and have it be a useful learning experience, unless they have either had breakfast or have a good midmorning snack. Cereals can be a very important part of a good breakfast. The way to make children eat breakfast is very often more painful, however, than to have them watch advertisements. It may just be that you have to get them up earlier so that they are not immediately confronted with breakfast before they are really properly waked up.

Senator PERCY. Have you tried this experiment ever?

TRADITIONAL CEREALS OFTEN THE BEST

Dr. MAYER. Yes, many times. Let me add that when I gave my answer I did not mean to say that all advertising was bad because there are good examples of food advertising. I was saying two things: First of all, with very small children there is some ethical question as to whether selling them things rather than selling through their parents is a proper procedure; secondly, those particular products which are specifically directed at children are not good nutritionally, when if anything they ought to be better than those produced for other age groups. In fact the traditional products of the cereals companies are still very often the best. Products directed at adults are often better than those directed at children.

Senator PERCY. We know that the American breakfast is a phenomenon. You go around the world and you are given a choice of a continental breakfast or American breakfast and the American breakfast is something we have sold to ourselves and now is being sold to the rest of the world.

Given the two choices, the continental breakfast—coffee and a bun or whatever it may be and an American breakfast—bacon and eggs, cereal, sugar-coated or otherwise, plus milk—which has the greatest nutritional value?

Dr. MAYER. I can't help but remind the committee this all started with Theodore Roosevelt announcing that "Good men eat breakfast" and it has been an article of faith ever since. Unfortunately, the answer to the question is a little more complex than this.

TYPICAL AMERICAN BREAKFAST . . . GOOD?

The typical American breakfast with bacon and eggs and cereals and all the trimmings is, in fact, a good breakfast for children and for anyone who is growing; pregnant, nursing women as well as children; but it is a very bad breakfast for you and me in that it is a high-fat, high-cholesterol breakfast and this is not really with what we ought to start the day. Thus, oddly enough, in many cases what one observes in a family is exactly the reverse; it is the man in the family who eats the breakfast not desirable for him while the children are eating basically a high carbohydrate breakfast, or no breakfast at all.

Senator PERCY. What if you are a believer in breakfast as I am, but a good breakfast, and you hold down the cholesterol. I have skim milk on my cereal, but I like natural cereal and I have encouraged one company, Quaker Oats, to come out with it. In fact, my daughter used to make our own and they now have it packaged. I don't think as a matter of fact there is sugar in it.

I can't help but recall that the head of the American Dental Association addressed the Rotary Club in Chicago one time. He talked about teeth care to adults. There were 2,000 men in that room and we had had a very sweet, rich dessert. He said, "I just took a glass of water and swished out my mouth a little bit after the meal and 95 percent or 99 percent of what would be accomplished by brushing your teeth was accomplished by doing that. You didn't do that. You are sitting there and that sugar is eating away in your teeth."

I noticed gradually 2,000 men within the next 3 minutes grab a glass of water and swish it around and I have been doing that ever since. Now it's a natural thing.

Now, to induce children to eat cereal with sugar or milk, wouldn't it be best to complement the natural thing? If our research showed that by television commercials, we could induce them to brush their teeth or swish out their mouths, wouldn't that be consistent with good nutrition and health? Aren't some of these answers much more simple than we might be led to believe if we just settled down to learn more about it?

Dr. MAYER. The answer is yes and no. As regards to properly purely dental questions, I would defer to the next witness or one of the next witnesses, Dr. James Shaw, who is a professor in the dental school at Harvard, and has done actual tests with cereal.

The problem of dental health is a very important aspect and I'm sure swishing water is one probable answer.

We are dealing with many cereals where, if you look at the box, you see that sugar is, in many cases, the first ingredient listed. Where there is only one cereal listed after sugar, it means that more than 50 percent of the "cereal" is sugar. I am not against the use of small or modest amounts of sugar, provided proper dental health practices are used, except in special cases like those prone to diabetes. But what we are talking about is massive amounts of sugar. It is a sobering statistic that for the last 2 years the American people have consumed more sugar than it has flour, which seems almost incredible. The consumption of flour has gone down over the years from somewhere about 300 pounds per-person-per-year to about 105 pounds this year. And the combination of sugar, which is on the order of 105 pounds plus sugar from corn syrup, which is another 10 pounds, means we are operating a food supply with people eating more sugar than flour.

Again, we are talking about moderation versus really extraordinary abuses. Particularly when you consider that a large part of the population eats relatively small amounts of sugar, it means we have a lot of children where sugar becomes a gigantic proportion——

Senator PERCY. What you are talking about is the influence of the sugar lobby, which is almost as good as the highway lobby. I have one last question, and then I would like to yield to Senator Schweiker.

My last question is. I was quite shocked to read a statement from these hearings held last December—I read about them in December and they were of worldwide interest—a statement by USDA Assistant Secretary Lyng who said we really did not know enough about this subject to put together a reliable nutrition education program.[1] As a leading expert in this field of human nutrition, would you say that is a true statement, and we don't know enough yet?

Bombarded by Divergent Statements

Dr. Mayer. With due respect to Mr. Lyng, who has done a really splendid job of administering food programs—particularly the food programs for the poor in our country—I think this is a very extreme statement. The American people are indeed constantly bombarded on the one hand by self-serving statements which are really part of advertising, and on the other by extreme alarmist statements by food faddists of various sorts. So that people are getting the feeling that it is hard to get nutrition information, that they don't know what to believe, that one person is contradicted by another, and so on. But if you stay within the nutrition community, you find that there is very good consensus on what the nutrition message is. The Society for Nutrition Education has produced a list of recommended material for people to read at the family level or the professional level, and I don't think there is any doubt but we ought to have very much better nutrition education components in the schools and particularly as part of the School Lunch Program than we have. After all, we have all children from the age of 6 to the age of 18 every day in school lunchrooms. This is a great opportunity to teach nutrition by labeling the foods they eat in terms of both nutrition and ingredients. This should be supplemented by daily exposure to material which could be shown in the classroom without asking for additional work on the part of the teachers, who are busy teaching the fundamentals of education. A very large scale, very useful program could be launched, if the Department of Agriculture would give it leadership, and a little funding.

Senator Percy. Thank you very much, Doctor, and I would like to take this opportunity to commend you for the tremendous contribution you have made to this field. I think your services to this committee through the years have been valuable and have played a large part in helping us move up to close the gap between the overfed and the less fed. And we are very grateful to you for your expertise and knowledge in this field.

Dr. Mayer. Thank you, sir.

Senator McGovern. I think the record should show from the very beginning, Senator Percy has been the member of the committee which has most consistently pressed for investigation into the whole area of nutrition education and has been interested in this from the first month he was on the committee. Senator Schweiker is the member of the committee who conducted the hearings last year and, Senator, we are glad to yield to you at this point.

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[1] See 72/NE2, p. 143

Any Other Effects of Sugar?

Senator Schweiker. Thank you very much, Mr. Chairman and Senator Percy. Dr. Mayer, we are pleased to have you again before the committee. We do appreciate, as the other Senators have said, your fine contribution from this area.

I would like to pursue a couple of things in your statement. We are going to hear subsequently, I know, from the dental people, where we know there is a direct relationship between sugar and the effect on their profession. I just wondered, Doctor, do any of the other effects of sugar come to your mind in the relationship between sugar-flavored cereals and the impact on nutrition? What other research areas are we investigating?

Dr. Mayer. There are several other areas. The dental area is by far the best established and I think this will be documented very heavily by my colleagues. There are other dangers in consumption of very large amounts of sugar. First of all, sugar is the prototype of empty calories; it brings in calories, but it does not bring along with it any other nutrient in terms of protein, vitamins, minerals or enriched fatty acids. The second reason for seeing a potential danger in very large amounts of sugar is some intriguing research—which I emphasize is at this point still research, but is very suggestive. There are suggestions that individuals who have a diabetic ancestry, might be much more likely to develop overt diabetes if they consume large amounts of sugar than if they do not consume any sugar. This is indicated by a very particularly interesting piece of research which has been done by a very well known investigator, by the name of Dr. Aaron Cohen, at the University of Jerusalem. He showed that immigrant groups coming into Israel who had never been exposed to sugar had an extraordinarily low level of diabetes, while similar groups that had come earlier, and had adopted Western food habits with large amounts of sugar in their diet, had the 3 to 5 percent incidence of diabetes, which is seen in Western countries.

Finally, there is at least one type of blood condition [1] where there is too much fat of various types in the blood, which instead of being linked as are the majority of such conditions with excessive intake of saturated fat and cholesterol is linked with too much carbohydrates and in particular too much sugar. So there are reasons other than dental health and "empty calories." No nutritionist can really enjoy watching this mounting proportion of the calories in the diet—not necessarily mounting amounts, because people are tending to eat less, but the proportion represented by sugar is going up and up. I don't think any nutritionist can look at that with equanimity.

Genetic Characteristics in Diabetes

Senator Schweiker. That is a very interesting statement. I previously had the privilege of conducting hearings for the Subcommittee on Health about diabetes, and your tie-in here between the amount of

[1] See 72/NE2A, Dietary Management of Hyperlipoproteinemia, p. 260.

sugar consumption in diabetes is interesting. In 1980, one out of five persons will have diabetes or the inherited trait of diabetes to pass on to their children. They may not have the disease themselves, but when you realize that one out of five people either have genetic characteristics that will make children susceptible to the disease—and when you realize that the diabetes is the second leading cause of blindness and will be the first leading cause of blindness in the next 10 years—what you say here I think, is quite significant. I appreciate your observation, because I think there is more to it than just dental health, even though this is the best known cause-and-effect relationship.

So I appreciate your remarks, we probably should have had you at the diabetes hearings before the Subcommittee on Health, too.

One other question: You say in your statement it makes little sense to encourage nutrition education when the battle has already been lost by the time the 6-year-old enters school. Now apparently in this suggestion there is some kind of relationship with someone who develops a sweet tooth or a sweet taste. What can you tell us about a person who is educated by television and other media sources, who develops a sweet tooth or taste. Has he become hooked? What happens?

"Hooked on Sugar"

Dr. Mayer. It would seem that, although this is not the area which has been researched as carefully, it should. But certainly what we know about education in general, and food habits in particular is that the first years are extremely important. In fact, as we all know, there is some serious debating going on in the Nation on the extent to which compensatory education ought not to be pushed earlier; hence the emphasis on Head Start and the family-oriented programs, because the education people believe the very first years are very important. Surely that must be true of food habits, as well, and we do certainly know people who act almost as though they were hooked on sugar. No meal is complete without a slab of it. Thus it is quite natural that they choose it in terms of between meal snacks, and so on. It is hard to believe this is not an acquired taste.

Of course, sugar itself is a new commodity. I think people tend to forget that sugar was brought back from the East around the 15th Century, and was then introduced in the Americas in the 16th. Sugar itself is an Arab word, azucar. Then sugar plantations were started by the Portuguese in Brazil on a small scale at the end of the 16th Century and the consumption of sugar was really very very low until the 19th Century. I think the consumption of sugar in England was only about 6 pounds of sugar per-person-per-year in 1830—it is now 125 pounds per-person-per-year. Sugar is thus a new food and it is one in which the human system, at least many people, are not equipped to live with.

Senator Schweiker. Do Americans have the highest per capita consumption of sugar?

Dr. Mayer. No, the British do, and therefore British dental health is notorious.

Senator Schweiker. How far down the list are we?

Dr. Mayer. We consume somewhat less sugar than the British, but more corn syrup, and if I add the two together, I think you are around 115 pounds per-person-per-year, a very high amount which

represents about 15 percent of the food consumed by the Nation. Incidentally 100 pounds of sugar per year is the caloric equivalent of about 57 pounds of body fat per year. So one easy way to cut down is not to cut out carbohydrates, but to eliminate sugar.

Sugar Now Main Staple In Foods

Senator Schweiker. What you are saying is American dietary habits have really made sugar a main staple of our diet instead of a supplement, and we really do not know the ramifications of what this means, but research gives us a great deal of concern about what this would mean for our health.

Dr. Mayer. Yes, exactly.

Senator Schweiker. You also say in your testimony that advertising specifically to small children should be eliminated. Do you have any further suggestion or refinements as to how this might be handled?

Without Regulation . . . Outright Ban

Dr. Mayer. I would suggest that we try self-regulation first. I would hope that the industry might be willing to abide by the recommendations of perhaps a voluntary committee made up of child psychologists, pediatricians, dentists, nutritionists, representatives of both the food and advertising industry, as well as representatives of consumer groups and, particularly, mothers. This committee might, perhaps, review advertising and decide whether it has a redeeming social significance or not. Try perhaps, first of all, a voluntary approach to see what can be achieved by that means—particularly with the coming of nutritionalists laboring and, hopefully, more consciousness of the fact that nutrition ought to be in the message.

If that does not work, if the quality of nutritional advertising to children continues to be as poor as it generally is I would certainly recommend outright ban to advertising directed to children under 6.

Senator Schweiker. That is all I have, Mr. Chairman.

Senator McGovern. Thank you very much, Dr. Mayer. Now the committee will hear from a panel of three distinguished doctors who are testifying about the dental aspects of nutrition. Dr. Abraham E. Nizel, Associate Professor, Department of Oral Health Service, School of Dental Medicare, Tufts University; Dr. James H. Shaw, Professor of Nutrition, Harvard School of Dental Medicine; and Dr. Juan Navia, Senior Scientists, Institute of Dental Research, University of Alabama.

You gentlemen may be seated any way you wish. I think we will encourage questioning when you are finished with your presentations. We are pleased to have you three distinguished doctors here. I think this represents something of a first for members who are going to speak themselves for the Dental Association to make the type of recommendations we have seen in your prepared testimony. They have given some new steps with regard to nutrition as it relates to the condition of our teeth, so we are very happy to have you before the committee.

STATEMENT OF DR. ABRAHAM E. NIZEL

Dr. NIZEL. My name is Dr. Nizel and this is Dr. James Shaw, and this is Dr. Juan Navia. I am the only dentist on this panel. Each of these two gentlemen on either side of me are nutritional biochemists, who have made significant contributions in oral science.

I would like to give an overview of the dental caries problem in the United States today, and how it has been influenced by sugar consumption.

INTRODUCTION

I would like to start by defining the word dental caries. Dental caries is the decay of teeth produced by a chemicoparasitic process consisting of acid demineralization and bacterial dissolution. It is a complex disease caused and influenced by many factors. The three major ones are a susceptible tooth, decay-producing bacteria, and fermentable dietary sugars. The organic acids that demineralize the tooth are derived from the fermentation of simple sugar such as common refined table sugar or honey. These sugars are incorporated into a sticky bacterial film called dental plaque, that adheres to the tooth surface.

Incidentally, swishing and swallowing, as was mentioned previously is not an acceptable method of removing the adherent dental plaque. Swishing will only remove loose food debris. Only brushing will remove dental plaque.

Dental cavities result from an interaction of at least three factors:

1. A caries-susceptible tooth—which is one that has not been exposed to adequate amounts of fluorides:
2. An accumulation of dental plaque bacteria on the tooth surface:
3. Eating or drinking sugar-rich foods such as candies, cakes, soft drinks, et cetera.

PREVALENCE OF DENTAL DECAY IN THE UNITED STATES

The English word caries is derived from the Latin *carius*, which means rotten. Thus the word dental caries very aptly describes the most prevalent nutritional problem in the United States today, namely rotting teeth. Dental caries affects 98 percent of the people of the United States at some time during their lifetime, more particularly during the first 35 years of life. It is not a life endangering disease, but it can be extremely troublesome, incapacitating and expensive. It can cause pain, infection, facial disfigurement, chewing impairment, speech impairment and malnutrition.

According to the last comprehensive Government survey in the early 1960's, the average adult has about 18 decayed, missing or filled teeth out of a possible 32 natural teeth.[1] A survey of men at induction centers showed that the average inductee needed one extraction and about six restorations among other types of dental services.[2]

The American Dental Association has 104,000 members who share my keen interest on the subject of sugar and dental caries. They have

[1] U.S. Dept. of Health, Education and Welfare "Decayed, Missing and Filled Teeth in Adults, United States 1960–1962", Vital and Health Statistics 4 (1967).
[2] Cassidy, J. Personal Communication.

not adopted a specific policy on my recommendations but they do have their own recommendations which were first made known in the Journal of the American Dental Association in 1953.

In 1967, expenditures for dental care in the United States totaled about $4.7 billion and only 40 percent of the population saw dentists that year.[3] Of this $4.7 billion, about $2 billion was spent for repair of decayed teeth and it is estimated that it would cost $8 billion more annually to repair completely the damage caused by caries. Even if adequate funds were available, we don't have enough trained professional personnel to cope with such a rapidly developing disease. It is said that this disease develops so rapidly that if all the 100,000 dentists in the United States restored decayed teeth day and night, 365 days a year, as many new cavities would have formed at the end of the year as were just restored during the previous year.

Solution of Problems Through Prevention and Control

The solution to this problem, then, is prevention and control rather than repair. In other words, we should spend more of our intellectual energies and financial resources in finding and dealing with the *causes* rather than the *effects* of this ubiquitous disease.

Some real progress in dental caries prevention has been made in the last decade as a result of fluoridating public water supplies, the use of professionally applied topical fluorides and the teaching of plaque control. However, little if any progress has been made in terms of educating and counseling patients in food and nutrition as they relate to dental health. Yet all three of these factors (fluorides, plaque control and dietary advice) must be given equal emphasis to reduce significantly the initiation or development of dental caries.

Forty-three percent of all the people in the United States drink from fluoridated water supplies.[4] It is fair to assume that almost every dentist of the United States can and will apply topical fluorides to the teeth of his consenting patients.

It is also fair to assume that more people today than ever before are aware and doing more about brushing and flossing their teeth to remove dental plaque. This has occurred as a result of the active educational campaigns in preventive dentistry provided the dental profession by the Armed Forces, dental schools and dental societies such as the American Dental Association and the American Society for Preventive Dentistry.

So far, the weakest link in this triad of dental caries prevention is the *lack of nutrition education and guidance* with respect to decreasing sugar-sweetened snacks and suggesting more acceptable, more nutritious alternatives.

Evidence of Sugar/Human Dental Caries Interrelationship

There is an abundance of epidemiological and experimental evidence that indicates that sugar unquestionably is the principal cariogenic agent in the diet—or as Dr. Newbrun says, "the arch criminal of dental caries."

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[3] U.S. Dep't of Health, Education and Welfare, "Selected Dental Findings by Age, Race and Sex: United States 1960–1962." Vital and Health Statistics 6 (1965).
[4] U.S. Fluoridation Picture After 25 years. J. Amer. Dent. Assoc. 80: 756, 1970.

Epidemiologically, a clear relation between national usage of sugar and the increased incidence of dental caries has been demonstrated. For example, 20–24-year-old civilians living in the Near East and Far East countries who consume an average of 6–19 kilograms of sugar per-person-per-year experienced a decay rate of 0.6 to 5.0 teeth. Whereas, in South American natives where the consumption of sugar varies from 23–44 kilograms per person, per year, their decay rate is correspondingly higher, starting at 8.4 and going as high as 12.16 teeth.[5]

There have been several surveys showing significantly increased dental caries experience in Eskimos and African tribesmen who were originally exposed to primitive foods and dietary practices and subsequently changed to modern types of refined foods, particularly sugars. Another example of the dental health penalties of the so-called civilized diets was seen in natives living on an island. Tristan da Cunha. In 1938, the diet of the natives of this island consisted of two staples, potatoes and fish *but no sugar*. Not a single first permanent carious molar was found in any of the young people under the age of 20. In 1962, Dr. Holloway went back and found that they were consuming an average of one pound of sugar per week, per person with the result that a comparable age group showed 50 percent of their molars to the carious.[6]

In Norway during World War II, there was food rationing which included a reduction in consumption of sugar and refined carbohydrates with a concurrent increased consumption of potatoes, vegetables, milk and bread. A progressive decrease in occurrence of caries was associated with these forced dietary changes from 1942 to 1946. However, the caries incidence began to rise in 1947 and 1948 as the restriction of sweets were lifted.[7]

There have been a couple of institutional studies—an orphanage in Australia [8] and a mental hospital in Sweden [9] where sugar intake was closely supervised and correlated with dental caries development. They were able to clearly demonstrate that the less the sugar intake, the lower the dental caries. Some of the important conclusions that were drawn from the Swedish study were that although excessive amounts of sugar were dentally deleterious, the form of the sweets (retentive worse than nonretentive) and the frequency of between meal usage were the prime factors in promoting caries activity.

There have been several other studies [10] that have underscored the fact that frequent between-meals eating of sugar-sweetened snacks promotes caries production significantly. The reason is that each time the dental plaque on the tooth surface is exposed to sweets 20–30 minutes of acid is produced. Thus, if 5 lozenges, breath mints or cough drops were eaten one after another within a space of 15 minutes, they might produce only 35 minutes of acid. On the other hand, if the same number were each eaten 20 minutes apart, they probably would produce at least 100 minutes of acid.

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[5] Russell, A. L. World epidemiology and oral health P 21–39 (In Kreshover, S. J. and McClure, F. J., editors. Environmental variables in oral disease. Washington, American Association for the Advancement of Science, 1966).

[6] Holloway, P. J. et al: Dental Disease in Tristan da Cunha. Brit. Dent. J. 115: 19, 1963.

[7] Toverud, G. et al. The influence of war and post-war conditions on the teeth of Norwegian school children. Milbank Me. Fund Quart. 39: 489, 1961.

[8] Harris R. M.: Biology of the children of Hopewood House. J. Dent. Res. 42: 1387, 1963.

[9] Gustafsson, B. E. et al. The Vipehold dental caries study. Acta Odont Scand 11: 232, 1954.

[10] Weiss, R. L. and Trithard, A. H.: Between-meal eating habits and dental caries experience in pre-school children. Amer. J. Pub. Health 50: 1057, 1960.

The current vogue of increased snack eating becomes a great dental problem in the United States today. We must do something in the area of improving the nutritious value of the snack program from a dental standpoint. One suggestion is that these snacks be fortified with an anticaries agent—phosphates—to decrease the dental decay hazard.

Senator McGOVERN. Dr. Nizel, in that connection you have been talking about the danger of breath mints. What about these sprays that are on the market designed to sweeten your breath. Do you think they have any bad effect on teeth?

"CERTS DENTAL DISEASE"

Dr. NIZEL. We don't have any evidence that there is any deleterious effect from a dental standpoint, none at all. But since commercial names have been mentioned here previously, I must record an observation that my dental colleagues and I have noted with some alarm—namely "Certs Dental Disease." People who continuously pop breath mints into their mouth develop demineralized areas on the gum line area of the teeth which becomes carious.

Senator McGOVERN. Using these little Certs or other similar products?

Dr. NIZEL. Right.

The statistics in sugar consumption in the United States has increased dramatically over the last 150 years. We started with 10 pounds in 1821 and we are now consuming up to well over 100 pounds per-person-per-year, which amounts to about 2 pounds per capita per week.

The American Dental Association issued some resolves on sugar and dental caries, I will read two of these.

First they resolved that the association recommend that dental societies call to the attention of their patients this information on sugar and dental caries. And, second, the association emphasized the responsibility of manufacturers of sweetened beverages and confections for devising suitable methods for eliminating the dental health hazards associated with the consumption of their product.

Speaking of the stand of the American Dental Association on these types of issues. I also want to bring to the attention of this committee that last year there was passed by Congress the National School Lunch Act. In the course of extending that act. Congress restricted the long established authority of the Department of Agriculture to regulate the sale of food items that would be in competition with the program authorized under he Child Nutrition and School Lunch Program. Congress thus has opened the door to the placement of vending machines offering sugar laden foods which have no real nutritional value in elementary schools. These will be sold of course in direct competition with balanced nutritious lunch programs. We are then going to be asking our youngsters to make a choice between candies and cakes which can harm their dental health. and nutritious, well-balauced quality meals provided by the school lunch program.

I think this is most unfortunate and the American Dental Association and other groups did make an effort last year to continue the original authority of the Department of Agriculture in this matter. However, the effort was unsuccessful.

I would make a plea to the committee to take such steps as it can to persuade Congress to reconsider its actions of last year.

Senator McGovern. In that connection, Dr. Nizel, is there an alternative possibility of leaving the vending machines, but setting guidelines as to the kind of products that can be put in them?

Dr. Nizel. Yes. I would think that that would be a suitable alternative, setting guidelines as to which foods or snacks are desirable.

Senator McGovern. See that nutritious foods and snacks are used.

Dr. Nizel. Yes: I would think it would be difficult to eliminate snacks entirely. However, I feel that nutritious nonsugar sweetened snacks should be the type put into vending machines.

To continue with my prepared statement: Sugar sweetened liquids as well as solid sweets will stimulate the formation and growth of sticky dental plaque as well as the multiplication of caries-producing bacteria.

A recently controlled experiment with children who consumed 12 ounces of soft drink a day for 3 years showed that they suffered in certain teeth as much as 50–150 percent more decay than another group who drank water. On the whole, the decay rate tended to be higher in the soft drink consuming group compared with the water-drinking group.[11]

The conclusions then, that one might draw from these studies, are:

1. Population groups that consume large amounts of sugar will experience much dental decay;

2. The quantity of sugar ingested is not the most important factor in dental caries causation;

3. Rather it is the frequent eating of even minute amounts of sugar confections or sugar sweetened drinks between meals that is most important.

Statistics on Sugar Consumption in the United States

The increase of the per capita consumption of sugar in the United States has been considerable during the last 150 years. In 1821, the annual per capita consumption of sugar in the United States was about 10 pounds, whereas by 1931 it had grown to almost 108 pounds.[12] The ingestion of this high amount of about 2 pounds per-week-per-person, has continued on for the past 40 years. One indication of how rapidly sugar consumption is increasing in the United States is shown by the amount used by food processors. In 1963 industrial food processors used 3.8 million tons or 8 billion pounds of sugar; whereas in 1967, 5.8 million tons or approximately 12 billion pounds were used—an increase of 33 percent in 4 years.[13]

Sugar is the primary ingredient in a number of food products that are widely consumed in large amounts. Sugar is the primary ingredient in baked goods, confections, beverages, preserved fruits and other prepared food items. In 1969, the per capita consumption of candy in the United States was 19.8 pounds: of carbonated beverages 450 8-ounce cans; and of chewing gum, 135 sticks. These three product areas alone account for almost 5 pounds of 100 pounds of per-capita consumption.

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[11] Steinberg et al. The Lincoln Dental Caries Study II: The effect of acidulated carbonated beverages on the incidence of dental caries. J. Am. Dent. Assoc. 81, 1972.

[12] American Medical Association, Council on Foods and Nutrition. Some nutritional aspects of sugar, candy and sweetened carbonated beverages. J. Am. Med. Assoc. 20: 763, 1942.

[13] Bollenback, G. N.: Sugars. In Schultz, H. W. (ed.) Symposium on Foods: Carbohydrates and Their Roles. Westpoint, Conn., The Avi Publishing Co., 1969 p. 373.

As a result of my personal experience at Tufts University School of Dental Medicine, in the area of nutrition counseling for the prevention and control of dental caries, I have made the following observations about the effect of the patients' nutritional knowledge and sugar intake on their own dental caries experience:

1. Children and particularly adolescents are the most caries-susceptible group. They also have the highest sugar intake and eat the poorest quality diets.

2. Over the last 10 years, my students and I have done thousands of diet evaluations on patients with rampant caries. We never have found a single patient whose caries problem could not, in part, be traced to the patient's inordinate consumption of sugar.

3. The estimated average number of between meal exposures to sugar sweetened snacks in caries susceptible individuals ranges between 5–8 per day.

4. Sugar sweetened beverages, sugar sweetened chewing gum and hard sucking type candies such as life savers, cough drops or breath mints are the worst offenders. Television advertising of these products certainly influences their increased usage.

5. The children's knowledge about nutrition acquired from secondary school systems is extremely inadequate.

Recommendations

My recommendations, as result of my own observations, personal experience and the literature fall into four areas—labeling, advertising, education, and research.

1. WARNING LABELS

I believe that as the FTC has already done health warning labels on cigarette packages, so should they require manufacturers to label every package of sugar-sweetened life savers, cough drops, breath mints, candies, chewing gum and soft drinks with a statement warning the user that excessive frequent daily use of these products can produce significant amounts of dental plaque and dental decay.

I have found so many people in my practice who don't realize that cough drops are made almost exclusively of sugar and that frequent use can cause cavities. I think it is important that this information be communicated to the user via warning labels.

Furthermore, we ought to label the types and amounts of carbohydrates—starch, sucrose, glucose—that are present in processed foods just like the types of fats (saturated and unsaturated) are being identified. Not all carbohydrates are equally caries producing, starches being very much less so. We ought to provide the public with this type of information. Just as they are being informed about the types of fats, they ought to be informed as to which kind and what percentage of carbohydrate is sugar and what percentage is starch.

2. ADVERTISING

I would think the FDA and FTC would require whole truths when advertising the health value of sugar and sugar products. Misleading statements like "Sugar, it isn't just good flavor; it's good food," which

touts quick energy but does not describe its tooth decaying properties, is not telling the whole truth about its effects on health.

And I would think we should ban the advertising of sugar sweetened products on children's television programs.

3. EDUCATION

I think the fine bill of Senator Schweiker which provides for grants for nutrition education programs in medical and dental schools is a step in the right direction. Encouraging the teaching of nutrition in medical and dental schools will provide the physicians and dentists with an understanding of the inter-relationship between the science of nutrition and health problems. It will help physicians and dentists assess the nutritional status of their patients, prescribe proper diets, and deal knowledgeably with food fads, misinformation and myths.

Better nutrition education programs are needed especially at the high school and college levels. Professional nutrition educators, not health teachers, should be hired for these purposes.

4. RESEARCH

A great deal of medical nutritional advances came out of the study at Framingham, Mass., on diet and heart disease. Similarly, a great deal of information can come out of extensive long-term clinical study diet and oral health. Financial support by the Government for such a dental nutrition research program is very much needed and highly recommended.

Clinical research should be supported for testing reasonably acceptable sugar substitutes such as miraculin, a protein, and the use of caries inhibiting additives to sugar products such as phosphates.

My colleague on the left and I, who both trained at MIT were the first trainees of the oral science department where we researched the effect of dietary supplements of phosphate on reducing dental decay. We think that sugar, for example, might be able to be converted from what is otherwise a caries-producing substance into a relative caries inhibitory substance by the addition of phosphates.

Senator McGovern. Thank you very much, Dr. Nizel. I won't question further until we hear from your colleagues. but I do want to ask whether or not the recommendations you have made here are supported by the American Dental Association, as well as your own personal view.

Dr. Nizel. These recommendations are my personal recommendations. The Dental Association has not taken any formal action on any of these recommendations at this point. However, I do understand that they will be discussing this matter in the very near future. On the basis of their past action, I feel sure that they will endorse most, if not all, of my recommendations; but at the moment they have not endorsed these particular recommendations.

Senator McGovern. Dr. Shaw, we will be happy to hear from you. Dr. Shaw is Professor of Nutrition, Harvard School of Dental Medicine.

STATEMENT OF DR. JAMES H. SHAW

Dr. SHAW. Thank you, Senator McGovern. It is a privilege to be here today, and I am really grateful that our Senate in the United States is concerned with matters like this and are willing to take the time and energy to meet to hear opinions like this. Much of what I said in the statement about causes of tooth decay duplicates what Dr. Nizel has already said. Though I came into the field from a different angle than he did, he as a clinician and I as an experimental scientist, the fact that we agree so completely without checking our statements in advance is a good example of the unanimity there is within this field on this subject.

Senator MCGOVERN. I might say and also Dr. Navia, that if you wish to just hit the highlights of anything you would like to add in the way of supplementary observations, we do have your prepared statements [1] and they will be made a part of the record, but if you prefer you can just summarize those parts that need to be reinforced.

Dr. SHAW. That is what I thought I would do, in view of the value of your time. I would like to particularly emphasize what Dr. Nizel has stated, that the frequency of consumption of sugar-containing products and the concentration of sugar are undoubtedly pivotal matters. The degree to which these materials are retained in the mouth and on the tooth surfaces certainly are the elements which determine whether or not a confectionary item is going to be cariogenic or not. One area in which both Dr. Navia and I have had considerable experience and we both agree insufficient research has been done is to determine the exact cariogenic capability of specific foods and items. In both our laboratories and those of Dr. Bibby at Eastman Dental Center, we have researcl under way to try and make evaluations of the caries-producing ability of specific foods. These studies are relatively early stages. In our own laboratories at Harvard, we have made some comparisons between standard varieties on the market of the sugar coated breakfast cereals versus the traditional types of breakfast cereals.

We have been feeding these materials as individual meals. In other words, the cereal wasn't mixed up with the total diet, but was fed separately either alone or with milk. It is very clear from our studies that the sugar coated cereals are much more cariogenic even when milk is added than is the case with regard to the traditional cereals.

As far as the amount of sugar consumption in the United States, certainly it has become fantastically high. I comment in my statement that the total amount of sucrose that is available for human consumption is over 100 pounds per year. If you figure this out on the average consumption per person per day, it works out to something like 500 calories per man, woman, and child. If you are an ordinary sedentary professor, sugar is going to supply something like a quarter of your total amount of calories in a day's time. I don't think anybody in the nutrition field would seriously question my statement that this is far too much in any sort of well-balanced nutritional diet.

Senator MCGOVERN Dr. Shaw, I wonder if I could stop you there. I just have been handed a news release that comes from one of the

[1] See prepared statements, p. 288 and p. 294.

cereal companies, General Mills. It is very short and I would like to read it to you and have you comment on it. This is dated March 5, 1973, "Statement on Cereals and Caries." It reads:

> To our knowledge there is no published evidence available to indicate that presweetened cereals, or cereals in general, cause caries in humans. This is not surprising, as sugar consumption from cereals is only a small proportion of total sugar intake. Presweetened cereals account for less than 2 percent of the total sugar consumption in the United States and less than 3 percent of total sugar consumed by children.

I wonder if you care to comment on that?

Data Too New for Formal Publication

Dr. Shaw. The statement is certainly correct that there is no published data specifically on humans in the subject. It is very difficult and expensive to do clinical studies where a single food like this is tested. And when I speak of having made tests, it is with animals where we fed the sugar-coated breakfast cereals as a specific meal or several meals during the day in well-controlled experiments. These data are not published either simply because we have only collected this information in the last few months. There just hasn't been time for them to get into formal channels of scientific publications.

Senator McGovern. Is there any question in your mind or in the minds of any of you three gentlemen about the harmful effect in the use of these sugar-coated cereals, as far as dental health is concerned?

Dr. Shaw. My concern is that sugar-coated cereals are just an example of many items in the typical American diet. I have no idea of whether only 2 percent of sugar consumption from sugar-coated cereals is factual or not. I am just concerned that here is another way in which a considerable amount of sugar is available. I think that this exhibit over here with 25 or 30 cereal products that contain 50-percent sugar or more is a tragic example of how a tremendous number of things are being put into the hands of the public which in themselves are not so terribly bad, but which exemplify the trends which influence our entire nutritional pattern. The multiplicity of such products leads us to heavy sucrose consumption beyond the level which is judicious for any purpose.

Dr. Nizel. Senator, in answer to your question, I would like to make a comment. I think Dr. Shaw and I have both pointed out that it is the frequency of eating these things that is the important thing. I also indicated that small amounts or a few grains of sugar at frequent intervals is just as bad as large amounts. The thing that we are really concerned about in the process of dental decay is the repeated tooth demineralization exposure time to even small amounts of sugar. So, it is not the fact that it is only 2 percent of the total sugar consumed but how often the child will snack on these sugar sweetened cereals. So it is the frequency of between-meal eating of these things that is really the crux of the whole situation, as far as dental health is concerned. How else are we going to help the youngster to avoid using these small amounts of sugar sweetened snacks unless we ban them or, at least, inform them of their potential dental hazard in the first place? So it is definitely the frequency and not the amount. Two percent of the sugar intake per year represents 2 pounds of sugar per year. There are millions of grains of sugar in 2 pounds. It takes only

a few grains in contact with dental plaque to produce dental decay.

Senator McGovern. Dr. Mayer testified a few minutes ago he was expressing his own personal feeling that we would be better off eating the old style of cereals of wheat, corn, rice and things of that kind. He was looking at it from a standpoint of dietary effect on the body as a whole. Would you make the same judgment about the tooth aspects or the dental aspects of it, that we would be better off with the old style cereals and cooked cereals?

Dr. Nizel. Yes, cooked cereals in general would be better than sugar-coated ready-to-eat cereals as far as dental health is concerned. The issue that concerns me is that the sugar-coated cereals are used as snack foods between meals; which is very bad from a dental health standpoint.

Senator McGovern. Dr. Shaw?

Hidden Sugar . . . Percentage Should Be Labeled

Dr. Shaw. I am concerned about the amount of sugar which is hidden and unknown to the consumer. Many of the baby foods, and many other kinds of manufactured foods contain substantial amounts of sugar beyond what is necessary for normal flavoring. It seems to me that one of the things that should be in the labeling act is a requirement that the percentage of sugar in every product should be labeled rather than, or in addition to the percentage of carbohydrates. I think that if you look across the American scene today, it is really tragic the number of breakfast programs which are supported by the Federal Government, for example, where a kind of sweetened cake is given to the youngsters rather than a real breakfast. If you look at these on the basis of protein and vitamins and mineral content, they are not bad nutritionally. The trouble is, in order to make them attractive, they have been made into cake form with icing and so forth in the hope the youngster will eat them.

They have the additional feature of being very handy for the administrators of the programs; but again, it is a way in which the youngsters are being confronted with something sweet on the basis of here is something that is really good for you. This action constitutes an endorsement of high-sugar content as a desirable feature in food.

Sugar Is Not a Food

I think this kind of ad in the November issue of the National Geographic, for example, is one to which your committee should address itself. This advertisement was produced by Sugar Information. This is after Sugar Information was presented to modify its advertising programs. I regret the continued use of slogans such as "Sugar, it isn't just good flavor, it is good food." The ad shows a handsome black youngster eating some kind of sugary confectionery item. I do not believe that sugar is a food.

Senator McGovern. Who sponsored that ad?

Dr. Shaw. It was sponsored by Sugar Information, General P. O. Box 94, New York, N.Y. There was another one in the series in the Reader's Digest of December 1972, which was quite different with regard to the picture, but the message was basically the same. I think

here again, it is a matter of sugar being advertised as good food and therefore the amounts consumed tend to creep up when basically the level is already far beyond what is desirable.

One of the points that I think your committee should not overlook is the fact that optimal fluoride ingestion and fluoridation of the water supply is not the complete answer to the dental caries problem. There is a common fallacy today that you don't have to worry about anything else. By reason of the fact that fluoride ingestion during tooth development builds up caries resistance, it is true that teeth are more resistant to the oral impact. However, they are not so resistant that, if the sugar level is high, and frequency of sugar usage is high, you are not still going to have high caries index. By cutting down sugar consumption and particularly the undesirable forms of sugar, you can add to the benefits that are available from fluoridation of public water supplies.

During the past 3 years, I had the opportunity to serve on an international committee in which an international union of nutritional scientists were seeking to explore the amount of nutrition teaching in medical and dental schools. It was particularly true in the United States, but to some extent around the world; there was very low emphasis upon nutrition teaching in medical and dental schools. Now there is considerable variation among schools, so I don't want this generalization to be taken as there is no school that doesn't do a good job, but by and large the average is there is much less nutrition education than is desirable for dental students and dental hygiene students.

One thing that we often forget is that, tragically, even the most carefully prepared fillings and bridges do not prevent the occurrence of more tooth decay. Only the teaching and the practice of preventive dentistry is effective in reducing the frequency of oral diseases. The teaching of nutrition in its basic science and applied phases is a very important facet which urgently needs strong emphasis in the dental curriculum. Unlike diptheria or tuberculosis, once you have cleared up the original problem, the body has built up immunity. But this is not true as far as tooth decay. It is interesting the extent to which our students are asking for more nutrition education, than was true a generation ago when I entered the field.

The recommendations that I would like to leave with you are as listed in my prepared statement.[1] However, first, I am very grateful for Senate Bill 324 that was introduced by Senator Schweiker of Pennsylvania because I believe it represents a constructive approach to the need for more nutrition teaching in dental and medical schools. Practically all, if not all, dental schools are understaffed with regard to sufficient qualified faculty and auxiliary personnel to teach the basic and applied phases of nutrition. I really trust that Congress will enact S. 324. Further, I suggest that adequate provision in the final version be made in this bill for training whatever additional personnel may be needed to staff the new positions.

Second, nutrition teaching needs to be increased at all levels of educational experience, not only in theoretical terms but in the day-to-day practical experience such as the design and quality of meals served in breakfast and lunch programs, and the availability of fruits, nuts, cheese, and other non-cariogenic, low sugar items for snacks from

[1] See prepared statement, pp. 289-90.

food dispensers, rather than the currently available candy, cookies, and sweetened soft drinks. This gets back to the earlier question of whether alternatives are available. I believe that they are.

Third, advertising in all media, but especially those ads on television aimed at children, to promote the use of sugar, heavily sweetened foods, such as sugar coated breakfast cereals, and candy and other confectionery items need to be sharply curtailed. Those allowed for use should be factual with respect to nutrition in the broadest sense.

Fourth, the media, and especially television at times when children and homemakers' programs are aired, should be encouraged to carry more attractive and constructive information on nutrition and specific subjects such as fluoridation, than is currently the case.

Fifth, more information needs to be collected on the caries-producing capability of specific foods and on the specific caries-producing capability of individual sugars and mixtures of sugars.

Sixth, manufacturers of foods and confectionery items need encouragement to search with diligence for ways to reduce the amounts of sucrose, in particular, and probably all sugars in their products. This reduction will require the search for other sweetening agents and for other compounds to make their products organoleptically satisfactory to the American public. I believe that a wide variety of foods and confectionery items can be developed with significantly lower sugar concentrations which are highly pleasing to the American public and which are simultaneously much less cariogenic.

Seventh, Senate Bill 805 introduced by Senator Moss to establish a National Institute of Marketing and Health contains an interesting concept. Certainly a greater need exists for supervision and planning of the kind of marketing and advertising than currently exists in the United States. I do not feel competently informed to comment on the wisdom of enacting this legislation. I shall await with interest the further discussion of this bill.

Eighth, product labeling must include percentage of sugars as well as percentage of carbohydrates. I think this is imperative in a truthful advertising campaign today, in view of the problems of sugar and health. Another recommendation which I am reminded to make about packaging, and one which my wife is a strong proponent of—namely, the prohibition of offers of giveaways or price-reduced merchandise on food packages or gifts within packages. I don't think that there is one of these cereal boxes over here which doesn't have some giveaway offer. I think when a package is put on the market, it should have to sell itself, because of what is contained in it. The package should not be purchased to obtain some item at a lower cost or free. These "gifts" encourage families, and particularly the children, to want the "gift" whether it be a plastic something or other, that dances or bobs, or whether it is vegetable or flower seeds or plants. This concept should be changed in our advertising scheme.

In conclusion I would like to speak of one organization that I think deserves commendation and that is the Nutrition Foundation, which is supported by many of the food industries. I think this foundation over the years has done a tremendous lot of good on the American scene. I myself am very grateful for the funds they provided in our laboratory for research and I think Dr. Nizel also has received funds from this foundation for teaching within the dental school framework.

One of the things I think also needs to be emphasized here is that the fortification of many cereal products with vitamins and minerals is a desire, that is really deceiving, to make up for the hollowness of the products that have been introduced by the heavy use of sugar. However, nutritionally the real problem is that this addition of vitamins and minerals doesn't in any way counteract the influence of the high sugar content.

PREPARED STATEMENT OF DR. JAMES H. SHAW

Causes of Tooth Decay

Tooth decay results from the action of products of bacterial metabolism on tooth substance. The oral microorganisms causing tooth decay colonize the pits and fissures of the chewing surfaces of teeth, the interproximal surfaces where the teeth touch each other and under some circumstances the smooth surfaces as well. These microorganisms require readily fermentable carbohydrates (simple sugars) in order to metabolize actively. Tooth decay progresses in proportion to the length of time per day that the decay-producing microorganisms are actively metabolizing. The pits and fissures and the spaces between teeth are natural traps for food where microorganisms metabolize food components to produce products which are related in amount and nature to the composition of the food.

Studies with human subjects over the past 40 years have shown that both the levels of consumption of the simple sugars and the frequency of their consumption are directly correlated with the incidence of tooth decay. Probably the best investigation of this kind was conducted in a state-supported institution at Vipeholm, Sweden at the end of World War II. The findings clearly indicated that tooth decay was definitely related to sugar consumption, with in-between-meal snacks being particularly harmful. In addition, such confectionary items as toffees and caramels which were both high in sugar and of such a sticky consistency as to be retained in the mouth and on the tooth surfaces were especially capable of producing carious lesions.

Clinical studies are difficult and expensive to conduct. Laboratory investigations with experimental animals, particularly rodents, have been especially helpful to examine, corroborate and extend data obtained from human subjects and to evaluate potential caries-preventing agents.

Animal assays and clinical studies without exception indicate that tooth decay experience can be greatly reduced if less sugar is consumed and if it is consumed less frequently. If the foods and confections which contain high amounts of sugar and which by reason of their consistency are retained in the mouth and particularly on tooth surfaces were consumed less frequently or were eliminated from the diet, tooth decay in man unquestionably would decrease by impressive amounts. Many items which are consumed as in-between-meal snacks are especially likely to be problems: Cake, cookies, candy, jellies, and jams. The frequency of snack consumption plus the kinds of items consumed coupled with the unlikeliness of subsequent oral hygiene cause items in these categories to be especially serious. Heavily sugared items such as frosted breakfast cereals, iced doughnuts, and sweet rolls also undoubtedly contribute to the high caries activity in our populace.

At present insufficient research has been done to give exact cariogenic ratings to specific foods and confections. A new era of emphasis to collect this kind of data is underway as a result of Congress funding the national caries program—a meaningful effort to bring the best information from the research laboratory and the clinic to bear for the prevention of tooth decay in our Nation. Under this sponsorship, studies to evaluate the specific caries-producing ability of individual foods or confectionary items are just beginning in several laboratories: Dr. Navia at the University of Alabama, Dr. Bibby at Eastman Dental Center, and our own at Harvard. In our laboratories, we are testing the caries-producing ability of specific foods by offering them to rats as in-between-meal snacks. It is very clear that items such as sugar-coated breakfast cereals are much more cariogenic than breakfast cereals which have not been sweetened as extensively. Also, cookies of various kinds are much more capable of producing caries than soda crackers.

Level of Sucrose in the American Diet

Sucrose (table sugar) is the most common sugar in the human diet because of the heavy dependence of the food and candy industry upon this compound as a sweetening agent and to give body and texture in many products. In the neighborhood of 100 pounds of sucrose is available annually for human consumption by every man, woman, child, and infant in the United States. If evenly distributed throughout the population, this level of consumption would provide about 500 calories per day per capita or one-sixth to one-fourth of our total caloric needs. Additional sugar is present in the diet: Lactose from milk and ice cream, glucose and fructose from honey, fruits and vegetables. However, the amounts of these sugars consumed are far lower than that for sucrose. No clinical or laboratory data whatever are available to support the often heard claims that raw sugar, brown sugar, honey, and maple syrup are any less cariogenic than products with comparable amounts of refined sucrose.

With the heavy usage of sugar in the preparation of baby foods and many foods where the added sugar is not an essential for preservation or even for a good natural taste, we are conditioned throughout life to sweeter foods than is nutritionally desirable. Many foods are consumed without recognition by the user that sugar has been added unnecessarily in processing. Product labeling is limited to the total percentage of carbohydrates rather than to a breakdown into starch and simple sugars. While "hidden" sugar constitutes a sizable portion of the total, the average man, woman, or child is responsible for adding still more to his food intake in a variety of ways.

Yet we are constantly being barraged by attractive and not so subtle advertising that "sugar isn't just good flavor; it's good food; it is quick energy," and so forth, even though sugar provides only calories and requires many other nutrients for its metabolism.

Relation of Fluoride Ingestion and Sugar Restriction in Caries Prevention

The consumption of adequate amounts of fluoride during tooth development results in teeth which are much more resistant to attack by caries-producing microorganisms than teeth which are formed with inadequate fluoride. Restrictions in sugar consumption aid in the maintenance of teeth after they have formed and erupted into the mouth. These two procedures complement each other by helping to prevent tooth decay through two separate pathways.

We must continue to press for fluoridation of public water supplies until the people in every community have this benefit. At the same time, every bit of progress in the restriction of sugar consumption especially in those forms and at those times which are most caries producing will add to the caries reductions attributable to fluoride ingestion alone.

Nutrition Education in Medical and Dental Schools

Not only in the United States but throughout the world, much less than the needed emphasis is placed upon the teaching of nutrition to medical and dental students. Numerous surveys in recent years have indicated the inadequate amount of nutrition instruction that is provided to the dental students and dental hygiene students in most schools in the United States. Instead, the emphasis is upon reparative technics. Tragically, even the most carefully prepared fillings and bridges do not prevent the occurrence of more tooth decay. Only the teaching and the practice of preventive dentistry is effective in reducing the frequency of oral diseases. The teaching of nutrition in its basic science and applied phases is a very important facet which urgently needs strong emphasis in the dental curriculum.

Recommendations

1. S. 324 represents a constructive approach to the need for more nutrition teaching in dental and medical schools. Practically all, if not all, dental schools are understaffed with regard to sufficient qualified faculty and auxiliary personnel to teach the basic and applied components of nutrition. I trust that Congress will enact S. 324. Further, I suggest that adequate provision be made in this bill for training whatever additional personnel may be needed to staff the new positions.

2. Nutrition teaching needs to be increassed at all levels of the educational experience, not only in theoretical terms but in the day-to-day practical experience such as the design and quality of meals served in breakfast and lunch

programs, and the availability of fruits, nuts, cheese, and other noncariogenic, low sugar items for snacks from food dispensers, rather than the currently available candy, cookies, and sweetened soft drinks.

3. Advertising in all media, but especially those ads on television aimed at children, to promote the use of sugar, heavily sweetened foods, such as sugar-coated breakfast cereals, and candy and other confectionery items need to be sharply curtailed. Those allowed for use should be factual with respect to nutrition in the broadest sense.

4. The media, and especially television at times when children and homemakers' programs are aired, should be encouraged to carry much more attractive and constructive information on nutrition and specific subjects such as fluoridation, than is currently the case.

5. More information needs to be collected on the caries-producing capability of specific foods and on the specific caries-producing capability of individual sugars and mixtures of sugars.

6. Manufacturers of foods and confectionery items need encouragement to search with diligence for ways to reduce the amounts of sucrose, in particular, and probably all sugars in their products. This reduction will require the search for other sweetening agents and for other compounds to make their products organoleptically satisfactory to the American public. I believe that a wide variety of foods and confectionery items can be developed with signicantly lower sugar concentrations which are highly pleasing to the American public and which are simultaneously much less cariogenic.

7. S. 805 to establish a National Institute of Marketing and Health contains an interesting concept. Certainly a greater need exists for supervision and planning of the kind of marketing and advertising than currently exists in the United States. I do not feel competently informed to comment on the wisdom of enacting this legislation. I shall await with interest the further discussion of this bill.

8. Product labeling must include percent sugars as well as percent carbohydrates.

Thank you very much.

Senator McGovern. Thank you very much. Dr. Shaw.

Now we will hear from Dr. Navia. He is the senior scientist of the Institute of Dental Research, and Professor of Dentistry at the University of Alabama in Birmingham.

STATEMENT OF DR. JUAN NAVIA

Dr. Navia. Thank you very much, Mr. Chairman, Senator Schweiker, ladies and gentlemen. I am especially delighted to be here. My goal as a teacher is to pass on information, hopefully expecting to produce some change in my students. Today I hope to pass on information to a group of people that certainly are able to do something concrete for the health of the people in our country. I am therefore especially delighted to be here.

In view of the fact that I probably have only a few minutes, and that my colleagues have already stated quite a lot of my own thinking, I will emphasize two or three points that I feel add another dimension to the problem of nutrition and oral diseases and oral health.

Nutrition of Special Relevance to Oral Diseases

I want the committee to realize that to oral tissues, nutrition is of special relevance, not only because of their own specific requirements, but because these tissues come in contact with food twice:

1. Once directly, when they are masticated in the oral cavity; and

2. A second time when, after digestion and absorption, the nutrients return by way of the circulatory system to nourish these tissues.

The nutrient composition of foods in the diet can influence teeth at two distinct stages. *Preeruptively* the chemical composition, as well as the eruption time of teeth, may be affected. During this period, nutrients in the diet can also select a pathogenic bacterial flora by enrichment of the environment and thus facilitate later the implantation and colonization of these microorganisms on the enamel surface of erupting teeth.

Posteruptively, nutrients in the diet can influence microorganisms on the enamel surface by facilitating plaque formation and stimulating their metabolic activities. Nutrients may also affect the flow and composition of saliva in contact with plaque and enamel, and finally, they can contribute to the composition of the outer enamel surface and possibly to the formation of the acquired pellicle. These different preeruptive and posteruptive effects of dietary nutrients have not been clearly recognized and controlled in experimental situations and epidemiological studies, and have led to misunderstanding as to the true effect of nutrition in the etiology and development of oral disease.

Recently there has been a lot of discussion for example, about the influence of protein malnutrition, on mental development, and how it can effect the intellectual powers of the individual forever. I would like to stress again to you that nutrients and foods can have two effects. One before the tooth erupts, when the tooth is being formed, and at that time nutrition and especially, malnutrition can have a very dramatic effect in increasing the susceptibility of teeth to diseases such as caries. Therefore, when you have a malnourished child, you have a child who is more susceptible to disease and there is not much that can be done systematically to increase tooth resistance. Now he can grow to be 6 feet tall, and very large and handsome and so on, but his teeth will be decayed.

Posteruptively the foods can also effect the surface and the amount of saliva and the kinds of organisms that are on the surface of the tooth, and therefore the presence of food ingredients such as carbohydrates will have very profound effect in terms of developing diseases such as dental caries.

We have heard before that it is not only the amount of carbohydrate. It is not only the type of carbohydrate that we are worried about, but one of the important things that we are to consider is the frequency with which we consume carbohydrate-containing foods. This is certainly relevant to our country, because we are really a country that is changing our dietary habits and we are going from meal eaters to nibblers.

Traditionally sweet, high-sucrose containing foods have fallen into the dessert food category. Today a major change is taking place in the food-consuming habits of people in the United States.

I have presented in my statement some tables [1] that indicate that in this country, we have changed the way we consume our food and while before most people had, or at least tried to have, three square meals in a day, today we find that we might have one, and then four or five snacks during the day and this is really constituting our overall eating pattern.

Actually, snack foods can hardly be classed as new, since most snack items—crackers, candies, cookies, ice creams, soft drinks, etc.—have

[1] See prepared statement, p. 296.

been around a long time. *The big change seems to be in consumer attitudes toward snacks* and the manufacturers' marketing strategies to meet the consumers' demand created by (a) prosperity, (b) a more informal life style, and (c) increased leisure time, plus time for more home entertainment. Foods included in that study contain substantial amounts of sucrose and are consumed as both snacks and desserts. Today, with increasing frequency, the dessert habit is considered by many an indulgence and something that, as much as possible, should be unlearned. Consumption patterns further indicate that the use of desserts or dessert-like products are most acceptable when used not as desserts, but rather as snacks.

The tables that I have included in my statement very clearly show to you how the usage of foods has changed and how before they were consumed as part of the meal, and today they are being used mostly as snacks. We have for example, in the item of cake, a 70-percent increase in the snack usage versus the meal. In the case of cookies nearly a 40-percent increase. In terms of pies or desserts of other types, we have a 75-percent increase, so we no longer consume any of these foods that are sugar consumed foods as dessert, but as snacks during the day and therefore we are really increasing not only our consumption of sugar in this kind of food, but also spreading it out during the whole day. This is even more serious because as our population expands continually, we are at the same time becoming a younger Nation.

Today, nearly half of the Nation's people fall into the under-27-year-old category. According to the Department of Commerce figures, by 1982 we will have increased in number by 22 percent, with 47 percent of our population in the under-24-year-old category. A majority will be 14–24 years of age.

This trend toward a younger Nation with more individuals in the age groups with a high caries susceptibility coupled with a changing life style which favors an increased consumption of snack items, many containing substantial amounts of sucrose, combines to project a situation which will contribute to an increase in caries production.

Not only do I think we have to look at the problem of pattern of consumption, I think that we should restress what has been said before, foods that contain sugar really have also an impact in terms of the nutrition of people. Foods compete for space in the stomachs of mankind. Every time a person selects a sugar-rich food, he does this at the expense of other foods. These other foods are always better as a source of protein, vitamins and minerals than the sugar which replaces them. It is for this reason that we have recommended in the past that such industrially-produced foods containing high levels of sugar be enriched with vitamins or minerals and other factors to improve the nutritional value and help reduce their caries potential.

Through the use of certain nutrients and agents such as phosphates, which are presently being tested in terms of humans manufactured food products can be improved. The fortification of sugar-containing foods to make them nutritionally self-sufficient is really advisable, although I recognize there are complex legal and technological difficulties which have to be cleared before we can implement these measures.

It is unquestionably true that the carbohydrate component of foods is the important caries promoting factor in the diet. Sugars are

metabolized by the bacteria on the surface of teeth to facilitate its adherence to the tooth and there produce metabolites which decay tooth enamel. Abundant and frequent consumption of sugar-rich foods therefore enhance caries disease.

As it stands today, sugar-containing foods have a caries potential which could be lowered by applying our research efforts and our technological competence to the production of attractive, palatable foods which do not endanger the health of the consumer.

We have no data to show you what would be the impact on human caries of substituting sucrose for other sugars, such as glucose or lactose, but preliminary data indicates that foods can be manufactured with a reduced amount of sucrose which are palatable, nourishing and with lower caries potential. Modification of the texture of foods could also reduce caries potential probably by reducing the residence time in the oral cavity of food debris. This is also a profitable avenue to reduce the caries potential of manufactured foods.

Now with regard to nutrition education in medical and dental schools, I just want to point out the fact that I feel that good nutrition is the best ally of preventive medicine or dentistry. What I feel is most important is that, if leadership is not exerted by the people who are competent in understanding the problem of nutrition, then the result is that other people who are less competent and less responsible are going to come in and become leaders and are going to misguide our young people that want to know about nutrition, about foods, about the affects of the abuses in its use. Considering that: (a) sugar is known to be a caries-promoting ingredient in foods: (b) we know that increasing the frequency of food intake is also a stimulating factor in caries development: (c) the per capita consumption of sugar in the United States has somewhat stabilized, but nevertheless, the use of sucrose in manufactured foods has increased tremendously in the last 5 years: and (d) because the eating pattern of the United States population is changing from meal eaters to that of nibblers, I really strongly recommend that first of all, nutrition teaching should be stimulated and supported in medical and dental schools to insure that health professionals are thoroughly aware of nutritional facts to be used either in their practice or in patient education or in health programs for the prevention of the diseases. And as I said before, their leadership in this field will eliminate the ill advise of people who are not thoroughly trained in this field and yet will give false hopes to the large number of people seeking nutritional and health information.

Then secondly, I think that manufactured food products containing high proportions of sugar should be reevaluated from a nutritional and dental health point of view in the following manner: (a) nutritionally they should be enriched to restore—not to supplement in excess amounts—their nutritional value to proper levels so as to make them metabolically self sufficient as far as possible: (b) from a dental health point of view, they should be reformulated, making use of those sugar substitutes or cariostatic supplements that reduce the caries potential.

Thirdly, I propose that there should be support for research in this area in order to understand the effects of sugar substitutes, changes

in food texture, and cariostatic supplements on the nutritional quality, the organoleptic acceptability of the food, and ultimately the health of the consumer.

And then finally, I suggest that full information should be available in the package as well as in the advertisement of a manufactured food about its nutrient composition and the possible effect on health that the consumption of this product in large amounts could bring to the consumer.

I would like to point out finally that there are no short cuts in life. You cannot get good nutrition in a little pill. You cannot be happy with a little pill. You cannot be healthy with one minute of exercise a day, and I think it must be understood by everyone that anything that is worthwhile requires effort and education to change our whole life. Good nutrition should be brought into our daily lives, through the use of wholesome foods orderly consumed during the day. If we incorporate it in this manner, we will get the benefits of this way of life.

PREPARED STATEMENT OF DR. JUAN M. NAVIA

INFLUENCE OF NUTRITION ON THE ETIOLOGY OF ORAL DISEASE

Nutrition is highly influential in the development of host resistance to oral disease. No other factor, aside from the microbial one, can enhance or retard the disease process as much as variations in the quality, quantity and frequency of foods consumed in the diet. Yet the true magnitude of this component in human oral disease processes has not been sufficiently measured or described.

The science of nutrition deals ultimately with the optimal cell requirements of certain essential elements and compounds during the process of reproduction, growth, maintenance, and function. In its broader aspect this science also encompasses the study of the nutritional requirements, reactions and interactions taking place in tissues, organs, and finally whole organisms. Foods in the diet provide these essential nutrients and so their nutritional composition, the amount and frequency with which they are consumed, and their physical and organoleptic properties are of special importance to the study of nutrition.

To oral tissues, nutrition is of special relevance, not only because of their own specific requirements, but because these tissues come in contact with foods twice: (*a*) once directly, when they are masticated in the oral cavity and (*b*) a second time when, after digestion and absorption, the nutrients return by way of the circulatory system to nourish these tissues.

The nutrient composition of foods in the diet can influence teeth at two distinct stages. Preeruptively the chemical composition, as well as the eruption time of teeth, may be affected. During this period, nutrients in the diet can also select a pathogenic bacterial flora by enrichment of the environment and thus facilitate later the implantation and colonization of these microorganisms on the enamel surface of erupting teeth.

Posteruptively, nutrients in the diet can influence microorganisms on the enamel surface by facilitating plaque formation and stimulating their metabolic activities. Nutrients may also affect the flow and composition of saliva in contact with plaque and enamel, and finally, they can contribute to the composition of the outer enamel surface and possibly to the formation of the acquired pellicle. These different preeruptive and posteruptive effects of dietary nutrients have not been clearly recognized and controlled in experimental situations and epidemiological studies, and have led to misunderstanding as to the true effect of nutrition in the etiology and development of oral disease.

Nutrients in the diet therefore can influence oral disease in the following ways:

(*a*) By changing the chemical environment of cells responsible for the formation of dental tissues;

(*b*) Influencing, either independently or together with hormones, the cellular enzyme systems involved in calcification processes;

(*c*) Altering protein synthetic reactions and thus modifying the nature of the calcifying organic matrix of mineralized tissues;

(*d*) Modifying the rate of flow, quantity or the physical, chemical or immunological properties of saliva;

(*c*) Enhancing or inhibiting the remineralization process taking place normally on the tooth surface of erupted teeth; and

(*f*) Influencing the multiplication, implantation and metabolism of the plaque flora.

In most oral disease processes the prognosis is usually determined by the interaction of host, microbial and nutritional factors. When they coincide, disease will ensue and when these factors are unbalanced the pathosis may be retarded or even prevented. Host factors involve genetic determinants which affect the quality of enamel, the morphology of teeth, the size ratio of teeth to mandible, the flow level and composition of saliva and other factors. The microbial factor is represented by the bacterial masses in contact with oral tissues. The tooth is normally covered by a dense layer of microorganisms which secrete metabolic products that are in constant contact and interaction with oral tissues. These organisms, under the influence of the nutrient composition of the diet and other unknown factors, may develop such a degree of virulence that disease (caries or periodontal disease) will become rampant if untreated.

Efforts to prevent disease by controlling the etiological microbial agent alone may be frustrating. A total or complete approach to the prevention of disease through modification of all three factors would be most rewarding.

Nutrition and Dental Caries

Dental caries is an infectious disease which is also influenced in its etiology by the interaction between microbial, dietary and host factors. Although the disease has existed for centuries, it is now ubiquitous, its incidence is increasing and in many areas it is rampant.

This change in the epidemiological pattern could be attributed to increased virulence of the cariogenic bacteria, but in reality diet is the etiological factor considered to be most responsible for this change in the extent and incidence of the disease.

The diet plays an important role in the selection, implantation, colonization and metabolic activity of the plaque microflora. Nutrients in the diet may retard or promote the formation and activity of a cariogenic plaque and the understanding of such effects in human caries is extremely important. The dental health status of an individual is thus largely determined by a balance between dietary factors which retard or promote caries.

The other important consideration in the nutritional aspect of caries is the dietary pattern or the combinations and frequency of consumption of foods during the day. The Vipeholm study and other studies have shown that the increased frequency of snack consumption was directly correlated with increased caries scores in preschool children.

It is therefore of great urgency to reevaluate and modify the foods used as snacks in order to control the development of caries in a population which seems to be shifting in dietary habits from meal-eaters to nibblers.

(a) Consumption Pattern of Snack and Dessert Foods in United States

Traditionally sweet, high-sucrose containing foods have fallen into the dessert food category. Today a major change is taking place in the food-consuming habits of people in the United States.

In a convenience food study completed in 1970 for the Iowa Development Commission by the Arthur D. Little Co., it was noted that "various factors such as the fact that members of the family may be away for periods during meal time, have contributed to making the fixed, three-meal-a-day schedule almost a thing of the past. At present, many persons have only two formal meals a day, with a third or even a fourth meal being a continuous snacking event throughout the day." Definitions of snack foods vary from "finger foods" to a "self-contained light meal" to "in-between food and beverage items that are consumed under conditions of recreation, sports or relaxation." Whatever the definition, the industry is growing. Snack food sales consumption rose 68.1 percent in the period 1956–68. In 1967, an AVISCO snack study reported that over half of all housewives bought snacks at least once a week. Almost three-fourths noted they bought more than one type of snack. With more women working, children are kept busy with a wide range of after-school treats until the evening meal is prepared.

Actually, snack foods can hardly be classed as new, since most snack items—crackers, candies, cookies, ice creams, soft drinks, et cetera—have been around a long time. The big change seems to be in consumer attitudes toward snacks and the manufacturers' marketing strategies to meet the consumers' demand created by (*a*) prosperity, (*b*) a more informal life style, and (*c*) increased leisure time,

plus time for more home entertainment. Foods included in that study contain substantial amounts of sucrose and are consumed as both snacks and desserts. Today, with increasing frequency, the dessert habit is considered by many an indulgence and something that, as much as possible, should be unlearned. Consumption patterns further indicate that the use of desserts or dessert-like products are most acceptable when used not as desserts, but rather as snacks.

In a 1969 Marketing and Economic Report on Frozen Desserts consumption data on snacks versus desserts, 4,000 households were surveyed as to their usage of 14 items during the 1962–63 and 1967–68 periods. The results as indicated in a chart below demonstrate the shift from dessert to snack usage in most of the food product categories included in this study.

INDEX OF HOUSEHOLD SERVINGS OF SELECTED FOOD PRODUCT CATEGORIES,[1] TOTAL SERVINGS, SERVINGS AS DESSERT, SERVINGS AS SNACK, JULY 1962 TO JUNE 1963 AND JULY 1967 TO JUNE 1968

Type of food	Total number of servings (Index, 1962–63=100)			Total dessert servings (Index, 1962–63=100)			Total snack servings (Index, 1962–63=100)		
	1962–63	1967–68	Percent change	1962–63	1967–68	Percent change	1962–63	1967–68	Percent change
Juices, drinks, ades:									
Ades	100	95.3	−3.7	100	182.4	82.4	100	100.3	0.3
Single noncitrus fruit	100	87.4	−12.6	100	107.7	7.7	100	96.2	−3.8
Soft drinks	100	132.5	32.5	100	214.3	114.3	100	126.3	26.3
Cakes	100	90.2	−9.8	100	67.2	−32.8	100	170.4	70.4
Cookies	100	88.1	−11.9	100	57.4	−42.6	100	139.9	39.9
Pies	100	98.5	−1.5	100	79.7	−20.3	100	124.0	24.0
Other baked desserts	100	99.1	−0.9	100	75.5	−24.5	100	174.8	74.8
Gelatin	100	116.1	16.1	100	104.9	4.9	100	154.1	54.1
Pudding desserts	100	97.5	−2.5	100	92.2	−7.8	100	142.6	42.6
Ice cream and related products	100	93.1	−6.9	100	82.7	−17.3	100	103.0	3.0
Fruit	100	89.1	−10.9	100	61.5	−38.5	100	156.1	56.1
Quick bread, toasted products	100	133.6	33.6	100	84.0	−16.0	100	135.8	35.8
Coffee cake	100	89.9	−10.1	100	75.9	−24.1	100	112.8	12.8
Donuts	100	73.4	−26.6	100	57.7	−42.3	100	103.6	3.6
Snacks, curls, chips, nuts	100	128.1	28.1	100	101.0	1.0	100	163.2	63.2
Candy (chocolate)	100	129.2	29.2	100	62.8	−37.2	100	146.5	46.5
Other candy	100	141.0	41.0	100	91.7	−8.3	100	148.0	48.0

[1] Selected product categories are those that have at least 20 percent of their total servings either as a dessert or as a snack serving.

According to production data based on U.S. Department of Commerce, Bureau of the Census, Census of Manufacturers Report (8), actual per capita consumption of the same product categories remained relatively constant over the 1963–1967 period, except for quite large increases in cookies and candy consumption. Data representing these product categories is shown below.

Food type	1963		1967		Increase or (decrease)	
	Million pounds	Pounds per capita	Million pounds	Pounds per capita	Million pounds	Pounds per capita
Cookies and wafers	1,924.7	10.20	2,358.1	11.92	433.4	1.72
Confectionery products (excluding chocolate products)	2,903.0	15.39	3,471.4	17.54	568.4	2.15
Cakes:						
Sweet yeast goods	863.4	4.58	1,025.1	5.18	161.7	.60
Soft cakes	1,138.2	6.03	1,193.0	6.03	54.8	.60
Pies	1,115.5	5.92	1,113.1	5.63	(2.4)	(.29)
Jams, jellies and marmelades	743.0	3.94	736.4	3.72	(6.6)	(.22)
Ice cream[1]	955.8	5.07	997.0	5.03	(41.2)	(.04)
Flavored milk drinks[2]	597.2	3.17	563.9	2.85	(33.3)	(.32)
Fruit drinks and ades[3]	57,021.0	.30	68,191.0	.34	11,170.0	.04

[1] Million gallons and gallons.
[2] Million quarts and quarts.
[3] Million cases and cases.

As our population expansion continues, we are at the same time becoming a younger Nation. Today, nearly half of the Nation's people fall into the under 27-year-old category. According to Department of Commerce figures, by 1982, we will have increased in number by 22 percent, with 47 percent of our population in the under 24-year-old category. A majority will be 14–24 years of age.

This trend toward a younger Nation with more individuals in the age groups with a high caries susceptibility coupled with a changing life style which favors an increased consumption of snack items, many containing substantial amounts of sucrose, combines to project a situation which will contribute to an increase in caries production.

(B) NUTRITIONAL CONSEQUENCES OF THE HIGH CONSUMPTION OF SUGAR-CONTAINING FOODS

Although the consumption of sugar in the United States has not increased in the past 20 years, the per capita consumption is twice the world average. Adolescents and young adults consume large quantities of carbohydrates, especially sucrose.

In response to cultural and technological demands, sugar is now so purified that many sugar-rich foods are nearly devoid of minerals and vitamins, and contribute nothing but calories to the diet. The public expects the food industries to provide food products which are palatable, safe, inexpensive, and nutritious.

Foods compete for space in the stomachs of mankind.—Every time a person selects a sugar-rich food, he does it at the expense of other foods, and these other foods are always better as a source of vitamins and minerals than the sugar which replaces them.

It is for this reason that we have recommended in the past that such industrially produced foods containing high levels of sugar should be enriched with vitamins and minerals and other factors to improve the nutritional value and to help reduce their caries potential.

The enrichment of sugar-containing foods with nutrients, and the supplementation of sugar with cariostatic agents such as phosphate, may create problems in food technology which should not be difficult to solve. Enrichment of certain sugar-rich food products may be undesirable because processing procedures are severe.

Raising the nutritional quality of these products through supplementation should not stimulate an increased consumption of sugar but rather prevent nutritional problems brought about by the extensive use of sugar in manufactured products.

If enrichment of sugar-containing foods is advisable for the United States and the Western Hemisphere, it is certainly even more important in the less technically developed countries of the world where the consumption of sugar-containing foods is increasing.

The fortification of sugar-containing products to make them nutritionally self-sufficient is advisable, although the author fully recognizes that there are complex legal, administrative, and technological difficulties which must be solved before this program can be fully implemented.

(C) SUGAR-CONTAINING FOODS AND DENTAL CARIES

It is unquestionably true that the carbohydrate component of foods is the important caries promoting factor in the diet. Sugars are readily metabolized by the bacteria on the surface of teeth to facilitate its adherence to the tooth and the production of metabolites which decay tooth enamel. Abundant and frequent consumption of sugar-rich foods therefore enhance caries disease.

We have no data at this time to show what would be the impact on human caries of substituting sucrose for other sugars, such as glucose and lactose, but experimental data indicates that foods can be manufactured with a reduced amount of sucrose which are palatable, nourishing and with lower caries potential. Modifications of texture of foods could also reduce caries potential probably by reducing the residence time in the oral cavity of food debris. This is also a profitable avenue to reduce the caries potential of manufactured foods.

As it stands today, sugar-containing foods have a caries potential which could be lowered by applying our research efforts and our technological competence to the production of attractive palatable foods which do not endanger the health of the consumer.

NUTRITION EDUCATION IN MEDICAL AND DENTAL SCHOOLS

Good nutrition is the best allied preventive medicine or dentistry has. To lay aside such knowledge would be folly, as there is no way that we can cope with disease at a therapeutic level. The highly-trained manpower necessary to treat sick people is nonexisting and costly.

The teaching of nutrition in dental and medical schools would insure that such knowledge is available to the health professional. Even though there are many areas which have not been sufficiently investigated, enough is understood today to enable them to use dietary manipulations in the preventive or in the therapeutic procedures used in the office or the hospital. Nutritional and dietary information will not only be useful to the patient, but will be carried to the patient's home, where it may influence the eating pattern of the whole family. The effectiveness of preventive nutritional measures relies heavily on patient self-care, a fundamental aspect of disease prevention.

For physicians there are also further reasons for being thoroughly trained in nutrition. In recent years the methodology involved in parenteral nutrition has been so developed that now patients for whom there was no hope of saving can be fed through the vein and brought back to normality. This procedure demands full understanding of nutritional principles so as to be able to restore the patient to a level where it can then be treated by other procedures. Advances in technology and methodology such as this one of parenteral feeding will be lost to the public if the science of nutrition is not taught along side other health discipline.

For dentists there are three areas in their professional activity in which nutritional and dietary knowledge will be required:

(*a*) *Clinical diagnosis.*—The dentist is unusual in the sense that in many cases he is the only clinician that has an opportunity to examine individuals for complaints other than nutritional problems. His understanding of the expression of nutritional deficiencies in the oral cavity can be valuable in the diagnosis of incipient problems before they bloom into overt chronic deficiencies.

(*b*) *Therapeutic procedures*, which can be supplemented and made more effective by dietary counseling directed to the clinical problems under consideration.

(*c*) *Health education* offered to the patient and through the patient to the family unit as a whole.

The last two items are of course equally applicable to physicians and dentist. The health education aspect is especially important in the practice of pediatrics or pedodontics, for the young patient can be influenced to incorporate into his living pattern those dietary practices which will enable him to maintain not only oral, but also general health.

Recommendations

Considering that—

(*a*) Sugars are known to be caries-promoting ingredients in foods;

(*b*) Increased frequency of food intake is also a stimulating factor in caries development;

(*c*) The per capita consumption of sugar in the United States of America has stabilized in recent years at a level of approximately 98 pounds, but its use in manufactured foods has increased; and

(*d*) The eating pattern of the U.S. population has changed from that of meal eaters to one of nibblers.

WE RECOMMEND THE FOLLOWING

(1) *Nutrition teaching* should be stimulated and supported at medical and dental schools to insure that health professionals are thoroughly aware of nutritional facts to be used (*a*) in their practice, (*b*) in patient education and (*c*) in health programs for the prevention of disease. Their leadership in this field would eliminate the ill-advice of people who are not thoroughly trained in this field yet they misguide and give false hopes to people seeking nutritional and health information.

(2) *Manfactured food products* containing high proportions of sugars should be reevaluated from a nutritional and a dental health point of view in the following manner:

(*a*) *Nutritionally* they should be enriched to restore their value to proper levels, so as to make them as metabolically self sufficient as feasible.

(*b*) From a *dental health* they should be reformulated, making use of those sugar substitutes or cariostatic supplements that would reduce their caries potential.

(3) *Support for research* in this area should be continued to understand the effects of sugar substitutes, changes in food texture, and cariostatic supplements on the nutritional quality, the organoleptic acceptability of the food, and ultimately the health of the consumer.

(4) *Full information* should be available in the package as well as in any advertisement of a manufactured food about its nutrient composition and the possible effect on health that the consumption of this product in large amounts could bring to the consumer.

Senator McGovern. Thank you very much. I have broken in several times with questions, so I am going to let Senator Schweiker lead off on the questions.

Senator Schweiker. Thank you very much, Senator McGovern. First I would like to compliment the panel. I think your testimony has been very helpful, positive, constructive and enlightening. I also appreciate the different members of the panel's reference to my nutrition education bill, and I think the support these gentlemen offered is very helpful to getting it through Congress.

Labeling Types of Carbohydrates?

I would like to ask a few questions, and I will begin with Dr. Nizel. Doctor, your statement did mention the possibility of labeling the kinds of carbohydrates, as I recall, that occur in packages, so that we have some very specific knowledge that we don't have now, which I think is an excellent recommendation. I wonder if you want to comment on this and also on your suggested substitutes. For instance, can you tell us a little more about this protein substitute? Is this commercially available, or is it in the research stage?

Dr. Nizel. There is a Merlin Corporation which is working with a protein called miraculin. It is derived from a berry which conditions your tongue for a short period of time in such a way as to make sour, tart fruits like grapefruit taste sweet. Also, there is another company that manufactures a different type protein, monellin, that imparts a sweet taste when added to foods.

Senator Schweiker. Now, the sugar substitutes that are on the market, saccharin and others, do they have the same chemical effect on the teeth as does sugar?

Sucrose Has Major Acidic Effect on Teeth

Dr. Nizel. No, they do not. The major sugar that has an effect on the tooth is sucrose. Sucrose is a disaccharide which breaks down into a monosaccharide and that, in turn, will break down into lactic acid. This reaction does not take place with a sugar substitute like saccharin Saccharin is different chemically and exerts no deleterious effect from a dental standpoint.

Another sugar substitute is sorbitol, which is an alcoholic derivative of glucose. It is metabolized very slowly. It is presently used in the so-called sugarless products. It does not produce acid as rapidly as the simple sugars do in the dental plaque.

Senator Schweiker. I think that is very helpful and very useful information, as well as your suggestion about warnings. I gather from your testimony as well as that of your colleagues that frequency of use is the most important factor?

Dr. Nizel. Yes, I think the public should be informed by labels on life savers, breath mints, soft drinks, and so forth, that the frequent consumption of these sugar-rich items will be harmful to their teeth.

Senator Schweiker. Now you recommend that sugar sweetened food for children could be banned, and I wonder if you think a ban is justified here?

Recommends Banning Sugar-Coated Cereals

Dr. Nizel. As Dr. Mayer testified earlier, the 5- or 6-year-old child should not be the family member who makes food choices based on nutritional values. I think sugar-coated cereals, which are empty calories and cariogenic, should be banned in the best interest for all concerned, particularly children.

You never find these sugar-coated cereals on the upper shelves of the supermarkets. I feel like Dr. Mayer does, that these youngsters are easily misled by advertising and do themselves and others dental harm by insisting on buying these foods. To protect them against this hazard, these products should be banned.

Senator Schweiker. And you also referred to sugar advertisements such as, "It isn't just good flavor, it is good food." And as a matter of fact, I saw one last night referring to sugar as "Great food energy." What is your professional opinion of those advertisements?

Dr. Nizel. Well, this type of advertisement doesn't tell the whole truth. It describes only one property of sugar. It is true it provides energy, but so do all other foods. But they ought to tell what else it does to the body besides providing energy. When they say it is good food, one would assume that it is good for one's general health. And, this is not a true statement because even a slight excess can promote dental decay, and diabetes in susceptible individuals. I don't think the word "Good" is a proper word to describe sugar because it does not contribute any benefit to one's general and dental health. In fact, it can do harm.

Senator Schweiker. I asked Dr. Mayer this question, although I am not sure there is a known answer, but what relationship do you see between children or other people who develop a sweet taste or sweet tooth. What is your comment to what happens here?

"Sweet Taste" Is Acquired, Not Natural

Dr. Nizel. My feeling is that taste can be acquired or is learned. One can also wean oneself from the taste of sweets. I know that if you have been using sugar in your coffee for a period of years, then you decide to omit the addition of sugar in your coffee, you can condition your taste buds to actually dislike the sugary sweet flavor. In fact, most people cannot put sugar back in coffee once they have acquired or learned to like the flavor of the coffee. We restricted sweets from our children, and to this day—at the age of 25—they do not like sweet desserts. It is just as easy to say "I dislike sweets" as "I dislike bitter tastes."

Senator Schweiker. I want to go back because I am trying that myself. If you cut sugar out of coffee, what is your first reaction?

Dr. Nizel. You learn the flavor of coffee yourself.

Senator Schweiker. The first reaction is very negative and unpleasant, I might add.

Dr. Nizel. At the beginning it is, and then you develop a taste for the flavor of coffee. This is like putting catsup on everything. You destroy the natural flavor of the food. Once you develop a taste for the flavor of natural coffee, then you will not be able to add sugar. You will find that sweetness may be so distasteful that it can be sickening.

Senator SCHWEIKER. So you are saying this sweet taste is an acquired learning habit and as such the obvious educational impact is one of the prime factors and it conditions people as far as——

KELLOGG COMPANY WILL TESTIFY

Senator MCGOVERN. Would you yield a moment, Senator Schweiker? We have a communication from Mr. Joseph Lonning, president and chief executive of Kellogg Company, and I would like to ask that it be made a part of the record. Let me just read it:

> The Kellogg Company of Battle Creek, Michigan, has assured me that it stands ready and willing to present its nutrition story and the company's policies relative to the use of its resources and creative talents of its own people, and that of its advertising agency, Leo Burnett, to the Senate Select Committee on Nutrition and Human Needs, or to any other proper committee. However, the company insists on its right to reserve its appearance to an open and fair forum. The Committee staff obviously doesn't understand the scope of that complaint by the FTC. However, we stand ready to testify on the nutritional aspects of our products and our methods of disseminating the nutritional value of our products to our customers.

That is all the committee ever wanted from the Kellogg Company, the testimony on the nutritional aspects of their products and the methods of disseminating the nutritional value of their products, and I think Senator Schweiker and the other members will agree we will be happy to receive the representatives of that company any time it is convenient to the company and to this Committee.

And I would also like to ask that a memorandum prepared by the legal representative to the committee, Mr. James Turner, on this matter be made a part of the record.[1] It is simply an analysis of the conflict between congressional hearings and administrative proceeding. If there is no objection, that will be made part of the record.

I want to say to our three witnesses that I have to go to another commitment that I am now late for, and I would like to ask Senator Schweiker to continue the questioning during the committee session as he sees fit. I do want to commend the three witnesses for the excellent testimony today.

Senator SCHWEIKER. Thank you, Mr. Chairman.

Dr. Shaw, if I may direct a few questions to you at this moment about your testimony. You refer in your statement to tests being conducted at Harvard making it very clear that sugar-coated breakfast cereals cause decay more than unsweetened cereal. Is this a new finding or has this been known before? What is your reaction to the impact of that particular study?

Dr. SHAW. This is new. These are experiments that we have been doing in the last years with funding we have received in part from the National Institute of Dental Research. What we have been doing is to set up caries tests where during certain times of the day, rats would have access to a normal diet and during some other parts of the day, they would have other foods or snacks or confections. The experiment which I reported here was one in which we compared sugar-coated breakfast cereals with the more traditional kinds. It has only been finished for a few weeks and as far as I know, nothing comparable to this has been done.

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[1] See Appendix, pp. 314–15.

Senator SCHWEIKER. In your statement you make a couple of recommendations, one that television advertisement of sugar products should be sharply curtailed; and, two, the restriction of sugar intake is especially important during the time in a child's life when he is young and his teeth are being formed. In essence then, aren't you and the other members of the panel saying that at the most critical times in the person's life in terms of sugar intake, maximizing the impact of sugar on these persons will have very deleterious effects in dental caries and perhaps even unknown areas now. So that we are recommending in essence that we take the situation and minimize the impact in terms of the child's health and teeth, preventive medicine, is that what you are saying?

Dr. SHAW. That is correct, as long as we don't limit it to the benefit being imposed simply during childhood. While the problems are most acute during childhood, yet they continue on through life. So that your statement is perfectly correct, only don't let's limit it to the childhood period.

Senator SCHWEIKER. We don't grow out of the problem just because we grow up.

Dr. SHAW. Exactly.

Senator SCHWEIKER. You also mentioned in commenting on my bill that there is an understaffing situation in the schools regarding nutrition. I just wonder if you would elaborate a little bit about what you feel the current status of dental schools are in this regard. You also make a good suggestion about the need for training more technical people in this field.

MAJORITY OF DENTAL SCHOOLS HAVE NO NUTRIENT PERSONNEL

Dr. SHAW. Yes. Well, I think when you look at the need for nutrition education in the dental schools of the country, it can be summarized something like this: Of the 56 dental schools at the present time, certainly only the minority of these schools has anyone on their senior faculties whose specialty is nutrition. Actually three of the dental schools with a senior faculty member in nutrition are right here, representing the University of Alabama, Tufts Dental School and Harvard. In these three schools, there is a senior person and there are complementary supporting people. As you look around the dental schools of the country, you will find many schools where there may be no one who is trained as a nutrition investigator and teacher. In a number of schools where there is someone on the faculty at a junior level, who has primarily been trained as a dietician who is responsible for instruction in applied nutrition. In general there is not an adequate depth of personnel to teach nutrition in our dental schools.

Senator SCHWEIKER. You are saying these three situations are really the main exceptions to the rule?

Dr. SHAW. Yes, but there are two or three other schools, but you see the main representation here.

Dr. NIZEL. In 1968, I ran a survey on the number of dental schools that have a nutrition teaching program. The result of that survey, in essence, said that only about 10 to 15 percent of the schools taught applied nutrition. I would say about 40 out of 60 schools taught some small amount of the biochemistry of nutrition. But when it came to

applying this basic knowledge at the clinical level, there were very few schools, maybe one-half dozen, that taught the applied aspect.

Senator SCHWEIKER. I wonder if you could send the committee the results of that survey? I don't believe you have that with you at this point?

Dr. NIZEL. Yes, I will send it to you.[1]

Senator SCHWEIKER. I think it would be very helpful to us.

Dr. Shaw, you also say that it is possible to develop a product with much lower concentrations that will be very pleasing to taste and we have already asked Dr. Nizel to comment on that. Maybe you would like to expand or elaborate a little more. Maybe this is a key to what our committee ought to be focusing on. What areas of alternate approach do we have and what are your suggestions?

SUCROSE COULD BE CUT BY 50 PERCENT

Dr. SHAW. I would like to give you an example, without naming the company involved, because I think that would be unfair. I was asked last June to talk to the research and advertising personnel in one of the large food companies of the United States about what I understood to be the problem between sucrose and other sugars and dental health. So we spent a day together in very careful intimate discussion of the matter. One very interesting point came out, which I think complifies what can be done if the company wants to do it. One of the 15 people said:

> You know, there is no reason why we can't cut the pancake syrups that we make in half as far as sucrose concentrations. There is no reason absolutely as far as palatability that sucrose can't be cut down by half or even lower and still have a marketable tasty product.

I think this is an example of what can happen if you bring the information to the industry. It gets them thinking about things they can do that they never stopped to think about before. If manufacturers would look at every one of the products today in which sucrose is used heavily, with ingenuity and some research as far as what is taste acceptable, and what is acceptable as far as the general mouth feel of the food, major reductions in sugar use could be achieved. These changes could be made without even thinking about other sweetening agents such as miraculin, that Dr. Nizel spoke about, and another one which is being worked on in Philadelphia, which they call monellin. They are very sweet compounds and readily metabolized in the body and have absolutely no potential to produce dental caries.

So I think the problem with the level of sucrose in so many of our foods today is that this has been an easy way and therefore the industry has just kind of slid along. Products sell better if they are sweeter, so why worry about high sugar consumption. But with ingenuity and research and a real desire to improve products, there is absolutely no necessity for the amount of sucrose that is in the products today.

Senator SCHWEIKER. So you are saying without really making many changes in the processing or marketing at all, we could accomplish quite a bit without going into sugar substitutes per se?

[1] Not available, at time of publication.

Dr. SHAW. Yes.

Dr. NAVIA. Just to give example of that kind of approach, I will tell you for example that we have ongoing research supported by the National Caries program of the National Institute of Dental Research, and one of the objectives of the research, is to produce and test for caries, snack foods in which sucrose is substituted for other sugars, and the process is highly interesting.

REFORMULATE SUGAR COOKIE WITHOUT SUCROSE

We reformulate a sugar cookie, for example, trying to substitute 85 or 90 percent of the sucrose for other sugars. We have tested different sugar combinations, that we now know have low caries potential, combinations of glucose, lactose and other sugars. We take this new reformulated sugar cookie and we have it examined by a taste panel, which would give the acceptability score and once we are sure that this is a sugar cookie which would be acceptable to the public, then we bring it into the laboratory and test it in experimental system. We test that newly formulated sugar cookie in comparison with one that contains sucrose, in a complicated piece of equipment that feeds rats meals and snacks just like humans do. The first preliminary results indicated that the reformulated cookie has lower caries potential in comparison with the one that has the original formulation with the full amount of sucrose.

Factors such as the changing of the types of sugars used and the use of all technological know how that we have today in the food industry, can really do a lot of good in terms of lowering the caries potential. This is also true for changes in textures. We can modify slightly the textures of the food, so the food does not stay in the mouth for a long period of time and therefore reduce again caries potential. These are avenues of research that are open and we have not yet explored them sufficiently, but we certainly should place a lot of effort in that direction.

Senator SCHWEIKER. Doctor, I would like to ask you one other question, as long as we shifted to you at the moment. You make the point, and the other members of the panel, also, to some extent, about the very changing lifestyle of Americans and how we used to think of something as a dessert food and now it is a dessert snack. Or a third or fourth or fifth meal food. I gather you feel this has had a very adverse effect on our nutritional habits and particularly on our teeth. Is what you are saying here, that this shift of eating habits, although it need not be, has had an adverse effect by the nature of how the shift is occurring? Is that what you are saying?

FREQUENCY OF "SNACKING" INCREASES CARIES

Dr. NAVIA. My comment here is in regard to dental health. In terms of dental health, which we know that if we feed rats two times a day, they will have a certain level of caries severity, but if you feed the same animals 5 times during the day or 10 times during the day or 18 times, you get a corresponding increase in the amount of caries. This has also been shown in experimental situations in humans, so we do know that as you increase the number of feedings during the day, you increase the chances for stimulating the disease. Our life style is cer-

tainly in the direction of helping the development of dental caries. If besides, the foods that you are consuming are those that contain a high proportion of sugar, then obviously your chances are excellent for having a lot of decay?

Senator SCHWEIKER. Is it also part of this pattern to say, in view of this change of lifestyle, that a higher per capita consumption of sugar probably means a more frequent use of sugar? In other words, we say that the amount of sugar, per se, is pertaining to frequency. But, does it also follow, from what you are saying, that per capita changes 10 to 20 years from now, with the lifestyle changes will put this Nation in bad shape?

Dr. NAVIA. You would get both, although we have had an increase in sugar consumption during the last 25 years, a very dramatic one. We don't think that during the last 5 years consumption has increased, but nevertheless, the level we have is more than sufficiently high. We don't need to increase any more to be in bad shape. We are in bad shape now.

Senator SCHWEIKER. I certainly concur. With five small children, I see them ruin the evening meal with snacks and see my wife get her blood pressure elevated for this reason. I think it is a very important point, and I think it is somewhat symptomatic because you can't divorce one from the other if you have small children.

Well, I thank you all very much. I think you have been most helpful and constructive. On behalf of the Chairman, Senator McGovern, I very much appreciate your testimony. Thank you very much for coming.

The committee is in recess, to reconvene on Tuesday at 10 a.m.

(Whereupon, at 1:05 p.m. the Select Committee was recessed, to reconvene at 10 a.m. on March 6, 1973, in room 1318 of the Dirksen Building.)

Appendix

MARCH 5, 1973

ITEM 1—ARTICLES PERTINENT TO THE HEARING

MEMORANDUM OF MARCH 1, 1973

From: Ken Schlossberg, Staff Director.
To: Members and Staff—Senate Committee on Nutrition and Human Needs.
Re: Companies and Advertising Agencies Refusal to Appear to Testify.

The business and advertising agency witnesses invited to testify on March 7 have declined to appear. While we have not yet received their formal refusals in writing, they have given their reason orally by telephone as being the complaint now pending against them by the Federal Trade Commission. Their position is that it would be inappropriate/not in their interests to discuss their advertising policies publicly while the FTC complaint remains unresolved.

In the opinion of legal counsel to the Committee, this position is not supportable. The FTC complaint (Docket #8883, attached) does not bear directly on the subject of these hearings, which is the advertising of foods to children on television in the teaching of good nutritional practices. The FTC complaint is primarily a restraint of trade complaint charging that the major cereal companies—Kellogg, General Mills, General Foods and Quaker Oats—have maintained a concentrated, non-competitive market structure and exercise monopoly power. Accordingly, the complaint alleges that certain advertising practices employed by these companies represent unfair methods of competition. Specifically, the advertising complaint alleges that some advertisements represent or imply that by eating the product a child will be able to perform various physical activities or feats as performed by athletes.

The FTC complaint appears, therefore, to bear only in a most indirect manner on the subject and focus of the hearings next week which is essentially—what kind of nutrition education are children receiving from the kinds of products, particularly breakfast products, being advertised to them during *their* prime time? What are they being taught is good food and good nutrition? A key question in this regard, of course, is the degree to which sugared products are being advertised to children. This is not mentioned in the FTC complaint.

Counsel to the Committee is in the process of preparing a more detailed explanation of this matter.

[Attachment.]

UNITED STATES OF AMERICA BEFORE FEDERAL TRADE COMMISSION

[DOCKET NO. 8883]

In the Matter of KELLOGG COMPANY, a corporation; GENERAL MILLS, INC., a corporation; GENERAL FOODS CORPORATION, a corporation; and THE QUAKER OATS COMPANY, a corporation

COMPLAINT

The Federal Trade Commission has reason to believe that the party respondents named in the caption hereof, and hereinafter more particularly designated and described, have violated and are now violating the provisions of Section 5 of the Federal Trade Commission Act (Title 15, U.S.C. § 45). Accordingly, the Commission hereby issues this Complaint stating its charges with respect thereto as follows:

1. Respondents have been and are now engaged in, among other business activities, the manufacture and sale of ready-to-eat (RTE) cereals. RTE cereals are food products made from barley, corn, oats, rice or wheat and various combinations of such grains which are flaked, granulated, puffed, shredded or processed in other ways. RTE cereals are eaten primarily as a breakfast food requiring no cooking or heating preparation by the consumer.

All of the respondents have been engaged in the cereal business for over 40 years, and in the RTE cereal business for over 30 years. Since 1950 respondents have consistently accounted for over 84 percent of the sales of RTE cereals.

A. Respondent Kellogg Company

2. Kellogg Company was founded in 1906. It is a corporation organized and doing business under the laws of the State of Delaware, with its principal office and place of business located at 235 Porter Street, Battle Creek, Michigan 49016. Kellogg manufactures and sells, among other things, RTE cereals, tea, soup, gelatin, and pudding.

In 1970 Kellogg had assets of $347 million and sales of $614 million. In 1970 Kellogg ranked 191st in sales among the nation's 500 largest industrial corporations.

In 1969 Kellogg's domestic sales of RTE cereals were $300 million and advertising expenditures for RTE cereals were over $36 million. Kellogg is the largest producer of RTE cereals in the United States.

B. Respondent General Mills, Inc.

General Mills, Inc. was incorporated in 1928. It is a corporation organized and doing business under the laws of the State of Delaware with its principal office and place of business located at 9200 Wayzata Boulevard, Minneapolis, Minnesota 55440. General Mills manufactures and sells, among other things, RTE cereals, flour, toys, chemicals, clothes, and jewelry.

In 1970 General Mills had assets over $665 million, and sales were over $1 billion. In 1970 General Mills ranked 116th in sales among the nation's 500 largest industrial corporations.

In 1970, General Mills' domestic RTE cereal sales amounted to $141 million and advertising expenditures for RTE cereal were $19 million. General Mills is the second largest producer of RTE cereals in the United States.

C. Respondent General Foods Corp.

General Foods Corp. was incorporated in 1922. It is a corporation organized and doing business under the laws of the State of Delaware with its principal office and place of business located at 250 North Street, White Plains, New York 10602. As the nation's largest food manufacturer, General Foods produces and sells, among other things, RTE cereals, coffee, beverages, frozen food, pet foods, and desserts.

In 1970 the total assets of General Foods were over $1.3 billion and sales were over $2 billion. In 1970 General Foods ranked 45th in sales among the nation's 500 largest industrial corporations.

In 1970, General Foods' domestic sales of RTE cereals were over $92 million and advertising expenditures for RTE cereals were over $9 million. General Foods is the third largest producer of RTE cereals in the United States.

D. Respondent The Quaker Oats Company

The Quaker Oats Company was incorporated in 1901. It is a corporation organized and doing business under the laws of the State of New Jersey with its principal office and place of business located at Merchandise Mart Plaza, Chicago,

Illinois 60654. Quaker manufactures and sells, among other things, RTE cereals, frozen food, cookies, pet foods, and chemicals.

In 1970, Quaker had assets over $391 million and sales of $597 million. In 1970 Quaker ranked 195th in sales among the nation's 500 largest industrial corporations.

In 1970 Quaker's domestic sales of RTE cereal were $56 million. Approximately $9 million was spent in 1970 to advertise Quaker RTE cereals. Quaker is the fourth largest producer of RTE cereals in the United States.

E. Nabisco, Inc.

Nabisco, Inc. is not a respondent herein. It has, however, participated in some of the acts and practices alleged herein and has contributed by acquiescence to the noncompetitive structure of the RTE cereal market, as alleged herein. Nabisco was incorporated in 1898. It is a corporation organized and doing business under the laws of the State of New Jersey with its principal office and place of business located at 425 Park Avenue, New York, New York 10022. Nabisco manufactures and sells, among other things, RTE cereals, cookies, candy, and snack foods.

In 1970 Nabisco's total assets were over $503 million and sales were over $868 million. In 1970 Nabisco ranked 140th in sales among the nation's 500 largest industrial corporations.

Nabisco's domestic sales of RTE cereals were $26 million in 1969 and advertising expenditures for RTE cereals were $3 million. Nabisco is the fifth largest producer of RTE cereal in the United States.

F. Ralston Purina Company

Ralston Purina Company is not a respondent herein. It has, however, participated in some of the acts and practices alleged herein and has contributed by acquiescence to the noncompetitive structure of the RTE cereal market, as alleged herein. Ralston was incorporated in 1894. It is a corporation organized and doing business under the laws of the State of Missouri with its principal office and place of business located at Checkerboard Square, St. Louis, Missouri 63199. Ralston manufactures and sells, among other things, RTE cereals, pet foods, animal feed, snack foods, and frozen food.

In 1970, Ralston's total assets were over $775 million and sales were over $1.5 billion. In 1970 Ralston ranked 71st in sales among the nation's 500 largest industrial corporations.

In 1969 Ralston's domestic RTE cereal sales were over $20 million and advertising expenditures were over $4 million. Ralston is the sixth largest producer of RTE cereal in the United States.

3. In the course and conduct of their business, respondents now ship, and for some time past have shipped, their RTE cereals from their respective production facilities in various states to locations in various other states of the United States, and maintain and at all times mentioned herein have maintained, a substantial course of trade in RTE cereals in commerce, as "commerce" is defined in the Federal Trade Commission Act.

4. Each of the respondents is in substantial competition with each and all of the other respondents and with other cereal producers in the manufacture and sale of RTE cereals in interstate commerce, except to the extent that competition has been hindered, lessened and eliminated as hereinafter set forth.

5. During the past 30 years the RTE cereal industry has experienced substantial growth. In 1940, 453 million pounds of RTE cereal were produced; 900 million pounds were produced in 1960; and in 1970 over 1 billion pounds of RTE cereal were produced. The value of RTE cereal increased from $163 million in 1950 to over $650 million in 1970.

In 1940 respondents' sales accounted for approximately 68 percent of the RTE cereal market; in 1950, for 84 percent; and in 1970, for 90 percent. In 1969 respondents controlled the following approximate shares of the RTE cereal market: Kellogg, 45 percent; General Mills, 21 percent; General Foods, 16 percent; and Quaker, 9 percent. In 1969 Nabisco and Ralston each had an approximate share of four percent of the RTE cereal market.

6. For at least the past 30 years, and continuing to the present, respondents, and each of them, have engaged in acts or have practiced forbearance with respect to the acts of other respondents, the effect of which has been to maintain

a highly concentrated, noncompetitive market structure in the production and sale of RTE cereal.

During this period respondents, in maintaining the aforesaid market structure, have been, and are now engaged in, among others, the following acts and practices:

A. BRAND PROLIFERATION, PRODUCT DIFFERENTIATION AND TRADEMARK PROMOTION

Respondents have introduced to the market a profusion of RTE cereal brands. During the period 1950 through 1970 approximately 150 brands, mostly trademarked, were marketed by respondents. Over half of these brands were introduced after 1960. In introducing and promoting these new brands respondents have employed intensive advertising directed particularly to children. Respondents have used advertising to promote trademarks that conceal the true nature of the product.

Respondents artificially differentiate their RTE cereals. Respondents produce basically similar RTE cereals, and then emphasize and exaggerate trivial variations such as color and shape. Respondents employ trademarks to conceal such basic similarities and to differentiate cereal brands. Respondents also use premiums to induce purchases of RTE cereals.

Respondents have steadily increased the level of advertising expenditures for RTE cereals. During the period 1950 through 1970, respondents' aggregate annual advertising expenditures for RTE cereals tripled from $26 million to $81 million. In 1970, respondents' advertising to sales ratio for RTE cereals averaged 13 percent.

These practices of proliferating brands, differentiating similar products and promoting trademarks through intensive advertising result in high barriers to entry into the RTE cereal market.

B. UNFAIR METHODS OF COMPETITION IN ADVERTISING AND PRODUCT PROMOTION

1. By means of statements and representations contained in their advertisements, respondents:

In advertisements aimed at children, represent directly or by implication, that their RTE cereals without any other foods enable children to perform the physical activities represented or implied in their advertisements.

In truth and in fact:

Respondents' RTE cereals do not enable children to perform the physical activities represented or implied in their advertisements. A child's ability to perform such physical activities depends on many other factors, including but not limited to general body build, exercise, rest, a balanced diet and age.

2. By means of statements and representations contained in their advertisements respondents Kellogg, General Mills, and General Foods represent, directly or by implication, that consuming RTE cereal at breakfast:

(a) Will result in loss of body weight without vigorous adherence to a reduced calorie diet.

(b) Will result in maintenance of present body weight even if total caloric intake increases, or

(c) Will result in loss or maintenance of body weight without adherence to regular physical exercise.

In truth and in fact:

(a) Consuming RTE cereal at breakfast will not result in loss of body weight without vigorous adherence to a reduced calorie diet.

(b) Consuming RTE cereal at breakfast will not result in maintenance of body weight even if total caloric intake increases.

(c) Consuming RTE cereal at breakfast will not result in loss or maintenance of body weight without adherence to regular physical exercise.

3. By means of statements and representations contained in their advertisements respondents General Mills and Kellogg:

(a) Represent, directly or by implication, that failure to eat one of their RTE cereals results in the failure of athletes or others to perform to their full capabilities.

(b) Represent, directly or by implication, that the ingestion of one of their RTE cereals by athletes or others enables them to perform better in their respective activities.

In truth and in fact:

(a) Failure to eat one of the RTE cereals of such respondents will not result in the failure of athletes or others to perform to their full capabilities.

(b) The ingestion of one of the RTE cereals of such respondents will not enable athletes or others to perform better in their respective activities.

4. The use by respondents of the aforesaid unfair methods of competition in advertising and product promotion has the capacity and tendency to mislead consumers, particularly children, into the mistaken belief that respondents' RTE cereals are different from other RTE cereals, thereby facilitating artificial differentiation and brand proliferation. These unfair methods of competition have contributed to and enhanced respondents' ability to obtain and maintain monopoly prices and to exclude competitors from the manufacture and sale of RTE cereal.

C. CONTROL OF SHELF SPACE

Kellogg is the principal supplier of shelf space services for the RTE cereal sections of retail grocery outlets. Such services include the selection, placement and removal of RTE cereals and allocation of shelf space for RTE cereals to each respondent and to other RTE cereal producers.

Through such services respondents have interfered with and now interfere with the marketing efforts of other producers of RTE and other breakfast cereals and producers of other breakfast foods. Through such services respondents restrict the shelf positions and the number of facings for Nabisco and Ralston RTE cereals, and remove the RTE cereals of small regional producers.

All respondents acquiesce in and benefit from the Kellogg shelf space program which protects and perpetuates their respective market shares through the removal or controlled exposure of other breakfast food products including, but not limited to, RTE cereal products.

D. ACQUISITION OF COMPETITORS

During the past 70 years numerous acquisitions have occurred in the breakfast cereal industry. One of the effects of these acquisitions was the elimination of significant sources of private label RTE cereal. Among them are the following.

In 1943, General Foods acquired Jersey Cereal Company, a Pennsylvania corporation. Before acquisition by General Foods, Jersey Cereal Company was a substantial competitor in the sale of private label and other RTE cereal.

In 1943, Kellogg leased and controlled the manufacturing facilities of Miller Cereal Company, Omaha, Nebraska, a substantial competitor in the sale of private label and other RTE cereal. In 1958, upon termination of the said leasing agreement, Kellogg purchased the assets of Miller.

In 1946, General Foods acquired the RTE manufacturing facilities of Campbell Cereal Company, Minneapolis, Minnesota, a substantial competitor in the sale of RTE cereal. Following this acquisition, General Foods dismantled the RTE facilities of Campbell and shipped said facilities to South Africa.

The aforesaid acquisitions have enhanced the shared monopoly structure of the RTE cereal industry.

7. Respondents, and each of them, have exercised monopoly power in the RTE cereal market by engaging in the following price and sales promotion practices, among others:

(a) Refrained from challenging each other's decisions to increase prices for RTE cereals, and, in general, acquiesced in or followed the price increases of each of them;

(b) Restricted the use of trade deals and trade-directed promotions for RTE cereals;

(c) Limited the use of consumer-directed promotions for RTE cereals, such as coupons, cents-off deals, and premiums.

8. Respondents' acts and practices aforesaid have had the following effects, among others:

(a) Respondents have, individually and collectively, established and maintained artificially inflated prices for RTE cereals.

(b) Respondents have obtained profits and returns on investment substantially in excess of those that they would have obtained in a competitively structured market.

(c) Product innovation has been largely supplanted by product imitation.

(d) Actual and potential competition in the manufacture and sale of RTE cereals has been hindered, lessened, eliminated and foreclosed.

(e) Significant changes in the RTE cereal market has been blockaded for over thirty years.

(f) Meaningful price competition does not exist in the RTE cereal market.

(g) American consumers have been forced to pay substantially higher prices for RTE cereals than they would have had to pay in a competitively structured market.

9. Through the aforesaid acts and practices:

(a) Respondents individually and in combination have maintained, and now maintain, a highly concentrated, noncompetitive market structure in the production and sale of RTE cereal, in violation of Section 5 of the Federal Trade Commission Act.

(b) Respondents, individually and collectively, have obtained, shared and exercised, monopoly power in, and have monopolized, the production and sale of RTE cereal, in violation of Section 5 of the Federal Trade Commission Act.

(c) Respondents, and each of them, have erected, maintained and raised barriers to entry to the RTE cereal market through unfair methods of competition, in violation of Section 5 of the Federal Trade Commission Act.

WHEREFORE, THE PREMISES CONSIDERED, the Federal Trade Commission on this 26th day of April, A.D., 1972, issues its complaint against said respondents.

NOTICE

Notice is hereby given to each of the respondents hereinbefore named that the 5th day of June, A.D. 1972, at 10 a.m., o'clock is hereby fixed as the time and Federal Trade Commission Offices, 1101 Building, 11th & Penna. Ave., N.W., Washington, D.C. as the place when and where a hearing will be had before a hearing examiner of the Federal Trade Commission, on the charges set forth in this complaint, at which time and place you will have the right under said Act to appear and show cause why an order should not be entered requiring you to cease and desist from the violations of law charged in this complaint.

You are notified that the opportunity is afforded you to file with the Commission an answer to this complaint on or before the thirtieth (30th) day after service of it upon you. An answer in which the allegations of the complaint are contested shall contain a concise statement of the facts constituting each ground of defense; and specific admission, denial, or explanation of each fact alleged in the complaint or, if you are without knowledge thereof, a statement to that effect. Allegations of the complaint not thus answered shall be deemed to have been admitted.

If you elect not to contest the allegations of fact set forth in the complaint, the answer shall consist of a statement that you admit all of the material allegations to be true. Such an answer shall constitute a waiver of hearings as to the facts alleged in the complaint, and together with the complaint will provide a record basis on which the hearing examiner shall file an initial decision containing appropriate findings and conclusions and an appropriate order disposing of the proceeding. In such answer you may, however, reserve the right to submit proposed findings and conclusions and the right to appeal the initial decision to the Commission under Section 3.52 of the Commission's Rules of Practice for Adjudicative Proceedings.

Failure to answer within the time above provided shall be deemed to constitute a waiver of your right to appear and contest the allegations of the complaint and shall authorize the hearing examiner, without further notice to you, to find the facts to be as alleged in the complaint and to enter an initial decision containing such findings, appropriate conclusions and order.

PROPOSED ORDER

Should the Commission conclude from the record developed in any adjudicative proceeding in this matter that the respondents are in violation of Section 5 of the Federal Trade Commission Act as alleged in the Complaint, the Commission may

order such relief as is supported by the record and is necessary and appropriate including, but not limited to:

1. Divestiture of assets, including plants and other facilities, for the formation of new corporate entities to engage in the manufacture, distribution and sale of RTE cereals, and such trademarks, brand names and know-how as may be required for, or useful in, such manufacture, distribution, and sale;

2. Licensing of existing brands or trademarks and future brands or trademarks on a royalty-free basis for a specified period of time;

3. Prohibition of acquisitions of stock or assets of firms engaged in the business of manufacturing or selling RTE cereals for a specified period of time;

4. Prohibition of any practices found to be anticompetitive, including but not limited to shelf space services or use of particular methods of selling or advertising acts or practices, and other provisions appropriate to correct or remedy the effects of such anticompetitive practices; and

5. Periodic review of the provisions of any order that may be entered.

IN WITNESS WHEREOF, the Federal Trade Commission has issued this, its complaint, to be signed by its Secretary and its official seal to be hereto affixed, at Washington, D.C., this 26th day of April, A.D., 1972.

By the Commission.

[SEAL.]

CHARLES A. TOBIN, *Secretary.*

MEMORANDUM OF MARCH 3, 1973

From: James Turner

To: Kenneth Schlossberg, Staff Director, U.S. Senate Select Committee on Nutrition and Human Needs.

Re: Legal Conflicts between Congressional Hearings and Administrative Proceeding.

FACTS

The Select Committee on Nutrition and Human Needs extended invitations to several food producing firms and their respective advertising agencies to join, as witnesses, an inquiry into nutrition advertising on television. After first accepting the invitations the business firms involved changed their positions and declined to appear saying they were following the advice of counsel with reference to the existence of an administrative (Federal Trade Commission) proceeding bearing some unspecified relevance to the subject matter of the announced hearings.

QUESTION

This situation presents the following question: Does the fact that an individual invited to appear as a witness at a congressional hearing and also happens to be a party to an administrative proceeding of some relevance (no matter how small) to the subject matter of the congressional hearing offer a reasonable legal justification for declining the invitation to appear at the congressional hearing?

DISCUSSION

It is of course the prerogative of any invited (as opposed to subpenaed) witness to decline any invitation for any reason. The question for this memorandum, however, is raised by the suggestion of each of the six invited witnesses that their respective legal counsel's have advised them not to appear for legal reasons.

Mr. J. E. Lonning, president of Kellogg Co., telegramed his reason for not appearing in essentially the same form as the other companies orally declined to appear. He said, "Unfortunately, the structure of the proposed hearings indicate the possibility of a broad inquiry into matters which are currently the subject of an administrative proceeding to which his company is a party. On advice of counsel, we feel it necessary to decline the invitation to participate."

The administrative proceeding referred to (FTC Docket No. 8883 In the Matter of Kellogg Co., General Mills, Inc., General Foods Corp., and The Quaker Oats Co.), concerns the allegation of the Federal Trade Commission that the identified corporations have monopolized the ready-to-eat cereal business It does not deal with the ways and means available for the development of nutritional advertising—the subject of the congressional hearing.

One of four sections in the FTC complaint specifically alleges that the companies have engaged in unfair methods of competition in advertising and product promotion. This section of the complaint concludes "These unfair methods of competition have contributed to and enhanced respondents' ability to obtain and maintain monopoly prices and to exclude competitors from manufacturing and sale of RTE (ready-to-eat) cereal." The ability to advertise cereals nutritionally has at most a peripheral relevance to this section of the complaint—the only section which deals with advertising.

The cereal companies do not rest their argument on the assertion that the subject matter of the congressional hearing and the administrative proceeding are the same. Rather they suggest that the hearing may be of such a broad nature as to include or touch on the material in the administrative proceeding. If Senate committees were limited to the consideration of only those matters

which could not possibly be the subject matter of a current administrative proceeding, they would be precluded from considering nearly all matters for which regulatory agencies have jurisdiction.

Committees are not so precluded. The rules governing the right of a committee to subpena witnesses set out the principles governing subject matter conflicts with other legal bodies. (An invitation to testify can legally be turned down for any reason which the invitee wishes.) The Supreme Court has made clear that a congressional committee can subpena any witness it desires in pursuit of the information it desires to carry out its constitutional responsibilities—even when the information sought can be useful in the prosecuting of pending suits.

The Court has stated "It may be conceded that Congress is without authority to compel disclosures for the purpose of aiding the prosecution of pending suits; but the authority of that body, directly or through its committees, to require pertinent disclosures in aid of its own constitutional power is not abridged because the information sought to be elicited may also be of use in such suits." *Sinclair* v. *United States*, 279 U.S. 263 (p. 295).

With this Supreme Court ruling as the guiding principle the committee could subpena the witnesses who have declined to appear voluntarily. This rule of law added to the fact that the administrative proceeding of concern to the cereal companies bears only a peripheral relationship to the announced purposes of the committee hearings suggests that there is no legal reason for the companies not to appear as witnesses.

CONCLUSION

Neither the facts nor the law concerning this situation or the overlap of interest between regulatory agencies and the Congress provides a reasonable legal justification for the invited corporation witnesses not to appear at the subject hearings.

[Advertising Age, Mar. 5, 1973]

CEREAL MAKERS SAY NUTRITION HEARINGS RIGGED; WON'T APPEAR

By Stanley E. Cohen

WASHINGTON, March 1.—Asserting that they had been "double-crossed," major breakfast cereal marketers have pulled out of scheduled Senate hearings where they hoped to talk about their nutritional education work.

Company executives said they originally agreed to appear after members of the Senate's select committee on nutrition and human needs praised Kellogg's new TV spots and said they wanted to hear more about the good things industry is doing.

But when they saw the committee schedule, industry people say, they discovered they were to appear after 2 days of committee hearings about the excessive amounts of sugar in foods and bad TV programs directed to children, and ahead of another day where executives of the Federal Trade Commission and the Federal Communications Commission will be asked about their problems with food advertisers.

Sen. George McGovern (D., S.D.), the committee chairman, said he intends to convene an executive session shortly "so members can decide what further steps" they wish to take to get the industry testimony. "Experts have emphasized a need for good nutritional education," he said, "and these companies have a responsibility to come forward and explain their policies."

He expressed skepticism over the official explanation which the companies are offering—that they cannot appear at a hearing where FTC officials might bring up the pending cases involving promotional practices of cereal companies. Sen. McGovern said the FTC complaints focus on restraints of trade and monopoly power, "and bear only the most indirect relationship to the basic kinds of nutritional education, health and diet questions which are the subject of this committee's investigation."

The committee's staff director, Kenneth Schlossberg, tells a different story. He said that as far back as last December, the committee had "touched" on advertising directed to children. The 5 days of hearings scheduled for next week are part of an effort to explore TV advertising of food, starting with the influence on children, he said, and that the staff was instructed to follow up last December's work by getting companies and ad agencies to describe their roles in promoting good nutritional practices to youngsters.

The schedule for next Wednesday, March 7, lists officials of Kellogg, General Mills and General Foods, together with chief executive officers of their advertising agencies. Quaker Oats was also invited, but comended it could not commit itself because its president, Robert D. Stuart Jr., who would be the appropriate witness, would not be available.

Scheduled to appear were Joseph E. Lonning, president-chief executive officer, and William Lamothe, exec vp-chief operating officer, Kellogg Co.; Leonard S. Matthews, president, Leo Burnett Co., the Kellogg agency; Ms. Mercedes Bates, vp-director, Betty Crocker Kitchens; Stuart B. Upson, president-chief executive officer, Dancer-Fitzgerald Sample, a General Mills agency; Richard Aszling, vp-pr/public affairs, General Foods; and Bernard Kanner, senior vp-management supervisor, Benton & Bowles, and Edward N. Ney, president-chief executive officer, Young & Rubicam, both General Foods shops.

On Monday, March 5, the committee starts by hearing Dr. Jean Mayer, Harvard University school of public health, a leading name among nutritionists; and three dental researchers: Dr. Abraham Nizel, Tufts; Dr. Juan Navia, University of Alabama; and James H. Shaw, a nutritionist from the Harvard school of dental medicine.

On Tuesday, the day preceding the industry testimony, the committee is to hear, among others, the industry's long standing antagonist, Peggy Charron and

Evelyn Sarson of Action for Children's Television; Robert B. Choate Jr., who heads the Council on Children, Media & Merchandising; and Tracy A. Westen, director, Stern Community Law Firm.

National Assn. of Broadcasters, the three TV networks, and the American Advertising Federation are to be heard on March 12, while on March 13 the hearing ends with Clay Whitehead of the White House Office of Telecommunications, who is openly critical of advertising and programs addressed to children; FTC Chairman Lewis Engman; FCC Chairman Dean Burch, and FCC Commissioner Nicholas Johnson.

One advertiser indicates it intends to stay in; Miles Labs, which is scheduled for Tuesday, immediately after ACT. Under pressure from ACT, it announced last fall that it is pulling vitamin ads out of children's programs, and it has recently offered TV stations a series of five 3-minute nutritional education films for children. A spokesman for Miles said it has nothing to fear from any of the testimony.

As the industry people tell it, they originally got involved in the belief that a welcome mat had been extended by such ranking committee members as Sen. Hubert Humphrey (D., Minn.), Sen. Richard Schweiker (R., Pa.) and the committee chairman, Sen. George McGovern (D., S.D.).

The cereal men apparently still hope to have an opportunity to tell their story, but they seem to be holding out for an arrangement which puts them on first, or lets them appear at some later time when they will have the forum to themselves. Spokesmen for two cereal companies offered essentially the same view: "We have a good story to tell about our recent nutritional education innovations. But we are vulnerable on sugar and on children's TV; and the way this is set up, we'll be in such a defensive situation our positive story will never come through."

But one cereal industry representative candidly admitted a major consideration is that the industry simply does not have persuasive answers on sugar or children's TV.

"Our track record is enormous, in terms of nutritional education innovations in TV, on packages, and in literature which we are offering the public," he said. "And we are going to see that senators get this information, in information kits, and perhaps in statements which we will submit for the record. But there simply is no way to tell our story on sugar or children's TV in a way that will come through positively."

One of the food industry people who helped arrange what then looked like a PR coup now says, in embarrassment, that he blundered into the kind of trap which haunts many industry efforts to operate in Washington. "I had to recommend that we pull out," he explained. "Suppose my chief executive officer came down here, presumably to tell our company's story, and then found himself in this kind of a who-struck-John situation. I'd never get him down here again, even assuming I kept my job."

Mr. Schlossberg did not think the cereal companies would find themselves in a defensive stance. He says, for example, that Messrs. Choate and Westen will be testifying primarily on their experiences in trying to get counter ads featuring nutritional information onto TV public service time.

However, Mr. Choate indicated he expected the sugar issue is going to emerge early in the hearing, and remain prominent throughout the first 2 days.

Mr. Choate said Kellogg and General Foods have backed research at Ann Arbor, Mich., and Elkhart, Ind., going back to 1963, seeking a chemical buffer which "will get sugar past the teeth," so "they can't deny awareness of the problem." He said the work has been conducted under new drug applications issued by the Food & Drug Administration.

The cereal industry representatives also see themselves as singled out for attention on a nutritional issue that cuts across other product categories, including candy and soft drinks. Mr. Schlossberg insists cereals were picked because they are the most heavily promoted products on weekend children's programs. But, a cereal man said, "We are carrying the load for the whole industry. It becomes a cereal inquisition."

GENERAL MILLS STATEMENT OF MARCH 5, 1973

CEREALS AND CONSUMER EDUCATION

General Mills has long been, and continues to be, very interested and active in helping to educate its consumers—especially in the area of nutrition. The company's educational efforts both supplement and complement its longstanding commitment to high nutritional quality in its cereals. The following examples illustrate some of the ways in which General Mills incorporates constructive education into its cereal advertising and promotional activities.

NUTRITION

During 1972, more than 125 million packages of General Mills child cereals contained nutrition copy describing the importance of a good breakfast, as well as an example of such a breakfast. Packages have also provided nutritional information on the four basic food groups. Such projects have been in addition to the complete ingredient listing, special dietary information and composition breakdown which are detailed on the side panel of every package of General Mills cereal.

During the past 10 years, more than 130 million boxes each of Wheaties and "Total" have devoted the back and/or side panel to the subject of health or nutrition.

In the near future, six free consumer-oriented nutrition education leaflets will be offered on 25 million of the company's food packages; it is anticipated that 500,000 of these leaflets will be distributed.

Not only on packages, but also in television advertising, General Mills strives to promote its cereals in the context of a complete and nutritious breakfast. Most of the company's commercials have shown a nutritious breakfast consisting of cereal with milk, toast, orange juice and a glass of milk. This is done in an appealing and entertaining format and in compliance with all appropriate children's advertising guidelines.

Educational efforts of General Mills cereals are not limited to nutrition. Some recent examples:

PUBLIC SERVICE ADVERTISING

During the summer and fall of 1972, General Mills cereal brands cooperated with the U.S. Department of Justice in offering a free drug education coloring book for children which showed young children the proper use of medicines normally found in the home. This offer was made on approximately 65 million cereal packages. As a public service, General Mills also advertised the coloring book in newspapers having a combined circulation of more than 14 million.

PACKAGE PROMOTIONS

The company attempts, when appropriate, to give an educational orientation to its cereal promotions and premiums. For example, current General Mills child cereal packages frequently feature an "Adventures in Learning" series. Using package backs, in-package premiums and mail-in offers, this series has offered such items as a miniature garden, foreign coins and stamps and a "super" ruler. It has also featured educational discussions of such topics as gravity and the refraction of light.

TELEVISION PROGRAMING

General Mills has been a recent sponsor of such educational child network television programs as "Take a Giant Step" and "Mr. Wizard," and has produced "Tennessee Tuxedo," a child television program which seeks to instruct as it entertains. The latter show is sponsored in more than 30 top television markets.

The company is currently sponsoring the program "Around the World in Eighty Days," which provides children with historical and geographical facts. In addition, General Mills has brought animated versions of a number of English and American literary classics to network television during the past 3 years. Included have been such works as "A Connecticut Yankee in King Arthur's Court," "A Christmas Carol," "Treasure Island" and "Robinson Crusoe."

Of paramount concern to General Mills, of course, is the nutritional quality of the cereals with which the above educational efforts have been associated. The company was the first to fortify its entire line of cereals with added vitamins and iron. It was the first to introduce a cereal fortified with eight essential vitamins—"Total," in July 1961—and the first to introduce a child cereal fortified with eight essential vitamins—Kaboom, in June 1969.

General Mills is continually striving to further improve the nutritional content of its products without sacrificing appetite appeal. A current example is High C Trix, available in selected markets, which contains more Vitamin C in a 1-ounce serving than 4 ounces of orange juice.

Other examples of the company's efforts to provide nutritious foods for breakfast are Breakfast Squares, Protein Plus and Breakfast Wrap-ups. Breakfast Squares is a baked, ready-to-eat, frosted bar product containing all the protein and basic vitamins and minerals needed to start the day. Protein Plus is a ready-to-eat cereal containing 25 percent high quality protein and fortified with vitamins and iron. Breakfast Wrap-ups is a line of frozen "meat and filling" products utilizing sausage or picnic ham surrounding scrambled eggs or hash-brown potatoes. All these products are distributed in regional markets.

Cereals and Caries

To our knowledge there is no published evidence available to indicate that presweetened cereals, or cereals in general, cause caries in humans. This is not surprising, as sugar consumption from cereals is only a small proportion of total sugar intake. Presweetened cereals account for less than 2 percent of total sugar consumption in the United States and less than 3 percent of total sugar consumed by children.

Nutritional Advertising

General Mills continually strives to offer commercials which employ an entertaining format, include the importance of a nutritious breakfast, and comply with all appropriate children's advertising guidelines.

In a typical 30-second cereal commercial, for example, when General Mills cereals are shown being served, they are shown as part of a nutritious breakfast consisting of a bowl of cereal with milk, toast, orange juice, and a glass of milk.

General Mills also advertises the importance of a good breakfast on the back or side panels of its cereal packages. During 1972, more than 125 million packages of General Mills child cereals contained nutrition copy describing the importance of a good breakfast as well as an example of such a breakfast. This is in addition to the complete ingredient listing, special dietary information, and composition breakdown which are detailed on the side panel of every package of General Mills cereals.

The Market Research Corporation of America's menu census data indicate that 38 percent of the U.S. population skip breakfast at least once in a 14-day period, and 17 percent skip breakfast at least half the time. Further, the data indicate that nearly nine of ten breakfasts consumed are nutritionally incomplete. Against this background, we feel we are making a significant contribution in the area of nutrition education by communicating to children the need to start the day with a nutritious breakfast.

Fortification of General Mills Cereals

General Mills has long been interested in the nutritional quality of its cereals. It was the first to introduce a cereal fortified with eight essential vitamins—Total—in July 1961, and its child counterpart—Kaboom—in June 1969. Addi-

tionally, the company's other cereals had been, for years, restored with thiamin, niacin, and iron to the natural levels of their basic grains.

In 1971, General Mills began fortifying its entire line of ready-to-eat cereals with added vitamins and iron. This included its two best-selling cereals, Cheerios and Wheaties; two more of its all-family brands, Kix and Country Corn Flakes; and three more of its presweetened children's cereals: Trix, Lucky Charms, and Frosty O's.

Fortification of these cereals—the adding of vitamins and minerals in quantities which make the product richer in nutrients than the original grains—supplies 33 percent of the officially established minimum daily requirements of vitamins A, B_1, B_2, C, niacin, and iron in 1 ounce of the cereal. Significant levels of vitamins B_6, B_{12}, and D have also been added. Another child cereal, Cocoa Puffs, has been fortified with six essential vitamins, plus iron.

The remainder of the company's line has been fortified since the time of introduction. This includes Kaboom, Count Chocula, Franken*Berry, Baron von Redberry, Sir Grapefellow, Boo*Berry, Buc*Wheats, regular Total, and Corn Total.

Exhaustive taste tests of each of the fortified products have been conducted. Their quality and palatability are equal or superior to nonfortified forms of the products.

The diets of some persons may be low in foods containing vitamins, as well as the iron, with which General Mills cereals are fortified. Many of these persons would be more likely, and would prefer, to obtain these nutrients through ready-to-eat cereals, rather than by adding greater amounts of other foods to their diets.

Cereal fortification is one of the steps in General Mills' continuing program for better nutrition. The milling industry and the company pioneered in the offering of higher nutrition foods by initiating the flour enrichment program more than 25 years ago and by restoring several major nutrients lost from cereals during processing. More recently, General Mills has been using enriched flour in many flour-based foods.

Latest examples of General Mills' efforts to provide nutritious foods for breakfast are Breakfast Squares, Protein Plus, and Breakfast Wrap-Ups. Breakfast Squares is a baked, ready-to-eat, frosted bar product containing protein and basic vitamins and minerals needed to start the day. Protein Plus is a ready-to-eat cereal containing 25 percent high quality protein and fortified with vitamins and iron. Breakfast Wrap-Ups is a line of frozen "meat and filling" products utilizing sausage or picnic ham surrounding scrambled eggs or hash-brown potatoes. All three products are distributed in regional markets.

Cost of Ready-to-Eat Breakfast Cereal

General Mills is proud of the product quality and dollar value the cereal industry has given and continues to give the American family. The breakfast it has been selling—featuring dry cereal with milk—is the best, most convenient, and least expensive nutritious breakfast that is popular with Americans.

A nutritious breakfast which includes cereal represents an economical alternative to other kinds of nutritious breakfasts. A cereal breakfast consisting of a 1-ounce serving of ready-to-eat cereal (with sugar and 4 ounces of milk), two slices of buttered toast, a 4-ounce glass of orange juice, and an 8-ounce glass of milk, costs the consumer approximately 22 cents.

This compares with a cost of approximately 35 cents for a bacon-and-egg breakfast consisting of two eggs, two strips of bacon, two slices of buttered toast, a 4-ounce glass of orange juice, and an 8-ounce glass of milk.

It also compares favorably in cost to a pancake breakfast consisting of two pancakes (with two pats of butter and three tablespoons of syrup), one slice of Canadian bacon, a 4-ounce glass of orange juice, and an 8-ounce glass of milk. Such a breakfast costs the consumer approximately 31 cents.

General Mills defines a nutritious breakfast as one which supplies at least 25 percent of an individual's officially established requirements of vitamins and minerals, 15 grams of protein, and 600 calories. All of the breakfasts described above, including the cereal breakfast, fulfill these requirements.

Presweetened Cereals

Breakfast is one of the most important meals of the day. Studies conducted at the University of Iowa concluded that persons eating a nutritious breakfast were generally more alert and efficient in performing a series of assigned tasks than persons not eating a nutritious breakfast.

Yet, the Market Research Corporation of America's Menu Census data indicate that 36 percent of the U.S. population skip breakfast at least once in a 14-day period, and 17 percent skip breakfast at least half the time. Further, the data indicate that nearly nine of 10 breakfasts consumed are nutritionally incomplete.

Cereals, and particularly cereals which are fortified with vitamins and iron, are widely accepted as contributing significantly to a good breakfast.

In June 1969, General Mills introduced Kaboom, the first presweetened cereal containing 100 percent of the officially established minimum daily requirements of vitamins and iron.

Since then, eight other General Mills presweetened cereals—Count Chocula, Franken*Berry, Trix, Lucky Charms, Frosty O's, Baron von Redberry, Sir Grapefellow, and Boo*Berry—have either been fortified with eight essential vitamins plus iron, or introduced at this level of fortification. A 1-ounce serving of each of these cereals provides 33 percent of the minimum daily requirements of vitamins A, B_1, B_2, C, niacin, and iron. Significant levels of vitamins B_6, B_{12}, and D have also been added. In addition, Cocoa Puffs has been fortified with six essential vitamins plus iron.

These cereals have all undergone exhaustive taste tests to insure that their quality and palatability are equal or superior to the products in nonfortified form.

As indicated, many of General Mills' cereals are presweetened. It has been our experience that many children strongly prefer presweetened cereals. The amount of sugar used in presweetening is controlled. A recent research project indicates that a preschool child consumes no more sugar by eating a presweetened cereal than when he adds sugar to many other cereals. Finally, only a modest portion of a child's daily intake of sugar is contained in one serving (1 ounce) of a presweetened cereal.

We believe our presweetened cereals can significantly contribute to the nutritional value of a good breakfast by providing essential vitamins, iron, carbohydrates, and food energy in a convenient form which is very palatable to and accepted by children. A breakfast that children do not eat will not make any nutritional contribution.

The Cost of Presweetened Cereals

The average cost of a 1-ounce serving of presweetened cereal is about 1 cent more than a 1-ounce serving of non-presweetened cereal. This relatively small difference in cost reflects the higher ingredient costs of presweetened cereals.

We believe our presweetened cereals contribute significantly to the nutritional value of a good breakfast by providing basic essential vitamins, iron, carbohydrates, and food energy in an extremely convenient form which is very palatable to and accepted by children. A breakfast that children do not eat will not make any nutritional contribution.

ITEM 2—ARTICLES OF SCIENTIFIC VALUE

[Journal of the American Dental Association, Vol. 47, No. 4, October 1953]

SUGAR AND DENTAL CARIES

The Effect on the Teeth of Sweetened Beverages and Other Sugar-Containing Substances

Previous studies of the Council on Dental Health of the American Dental Association have resulted in statements calling attention to the adverse effects of sugar on the teeth and in recommendations for reducing sugar consumption as a caries-preventive measure. The recommendations are based, primarily, on two substantiated facts: (1) that the consumption of sugar by a caries-susceptible person stimulates tooth decay and (2) that sugar in the diet frequently becomes a substitute for foods of higher nutritive value.

The recommendations of the Council have been challenged principally by manufacturers of products containing large amounts of sugar, such as soft drinks and confections. Because of the Association's responsibility for safeguarding the dental health of the American public, the Council developed the attached statement, documenting the known or potential hazards to dental health resulting from the frequent consumption of sweetened beverages and other sugar-containing substances.

A committee of the Council on Dental Health prepared the initial statement. After a critical review by members of the Council on Dental Health and the Council on Dental Therapeutics and by the research consultants of the Association, many suggestions were incorporated, and the statement was adopted by the two Councils as a joint report.

PURPOSE OF SCIENTIFIC APPRAISAL

In order to achieve a factual scientific appraisal of the effect of sweetened beverages on teeth, it appears appropriate (1) to review in some detail the essential etiologic factors in the process of caries, (2) to discuss in still greater detail the behavior of the dental bacterial plaque through which the sugar must operate in order for a beverage to become cariogenic, and (3) to submit the available evidence concerning (a) the decalcifying and (b) the cariogenic properties of such a beverage.

ESSENTIAL ETIOLOGIC FACTORS IN DENTAL CARIES

The patient researches of many investigators in many parts of the world have accumulated highly convincing evidence since 1867 regarding the process of dental caries and the factors essential for this process. The chronological road markers in the accumulation of this body of scientific information will be pointed out briefly.

1867—Leber and Rottenstein outlined most plausibly the thesis that intraoral, bacterial fermentation of carbohydrates produces dental caries; the inadequate bacteriologic technics of that period, however, prevented the submission of proof.

1881—Underwood and Miles, using aniline dyes as stains, demonstrated bacteria in the enlarged tubuli of carious dentin.

1879–90—Miller, working with Koch, determined that caries of a tooth is of external origin and, initially, is a decalcification of a limited area of enamel by localized acid derived from bacterial fermentation of carbohydrates.

1895—Black recognized the importance of and the specific distribution of bacterial plaques and developed the concept of extension of the margins of restorations to areas of the crowns of teeth least susceptible to caries.

1897—Williams demonstrated microscopically that bacterial masses (plaques) invariably were in contact with the surfaces of enamel experiencing beginning decalcification.

1903—Goadby pointed out that an acid-producing bacillus appeared essential for caries.

1915—Kligler determined that a group of lactobacilli was most responsible for the acids that produce caries.

1922—McIntosh, James and Lazarus-Barlow found that lactobacilli always were present in instances of active caries.

1922—Rodriguez demonstrated that only a few bacteria such as lactobacilli are sufficiently aciduric in nature to live in the degree of acidity necessary for decalcification of a tooth.

1925—Bunting and co-workers showed that lactobacilli were absent from the salivas of individuals completely free from caries.

1926—Bunting, Nickerson and Hard produced areas of decalcification under clasps *in vivo* by cultures of lactobacilli.

1927—Jay and Voorhees reported that lactobacilli could be isolated from the mouth several months before the detection of cavities in the patient previously free from caries.

1932—Dobbs completed laboratory studies on dental plaques which showed that these bacterial masses behave similarly to semipermeable membranes.

1932–33—Jay and others carried on studies which determined some of the conditions in patients that are essential for immunity to dental caries.

1933—Hadley developed a technic for counting the number of lactobacilli per milliliter of saliva, making available a means to evaluate promptly a variety of experimental procedures.

1933—Jay and co-workers found that cultures of lactobacilli fed to immune individuals are eliminated rapidly from their salivas.

1934—Koehne, Bunting and Morrell completed studies on 33 hospitalized girls and showed conclusively that new cavities develop in children on adequate diets when sugar is added to such diets.

1936—By adding candy to the diets, Jay and co-workers produced caries in institutionalized children who had experienced very little caries on an inadequate but low-sugar diet.

1939—Fosdick pointed out that a series of enzymes is essential to reduce carbohydrates in the mouth to organic acids.

1940—Stephan measured the acidity developed in the plaques of susceptible patients when 10 per cent glucose solutions were taken into the mouth.

1943—Fosdick and Burrill determined that pure sugar solutions increase the acidity of carious lesions.

1943—Dietz produced caries *in vitro* under conditions simulating those of the oral cavity, and studied microscopically the entire development of a cavity under a bacterial plaque.

1944—Hunt, Hoppert and Erwin reported the breeding of susceptible and of immune strains of rats.

In 1943, reporting on his ingenious laboratory study of the process of caries, Dietz pointed out the conditions essential for dental caries. They are (1) a caries-susceptible individual; (2) the presence of acid-producing and acid-tolerating bacteria which are capable of producing (3) an optimum bacterial enzyme system; (4) the presence of orally fermentable carbohydrate; (5) an adherent bacterial plaque. Some other oral conditions may modify the activity of caries. These conditions include types of proteolytic bacteria; flow, consistency, neutralizing power and antibacterial action of saliva; irregularity of teeth or tooth surfaces which contribute to the ready formation of a plaque; the presence or absence of certain amino acids and vitamin fractions, and the rate of solubility of enamel in organic acids. Practically all of these additional conditions, however, have to operate through a bacterial plaque, so only the five highly essential factors will be documented. Jay in 1951 stated these essential factors succinctly and listed four methods for preventing dental caries:

1. The complete restriction in the diet of the substances from which acids are produced.

2. The inhibition of the enzyme activity which is responsible for the acid production.

3. The elimination from the oral flora of the bacteria which produce the enzymes.

4. The reduction of the solubility of the tooth surfaces.

FACTOR 1. CARIES-SUSCEPTIBLE INDIVIDUAL

It was stated previously in this report that a caries-susceptible individual was one of the essential conditions for caries. Although much must be learned from a variety of research activities before physiologic immunity to dental caries can be induced in human beings, enough information already has been gleaned to know that there are persons in whose mouths caries cannot be produced by any means. Sweetened beverages apparently cannot serve as a source of cariogenic activity in those somewhat rare individuals, who are truly immune. At this point, therefore, some of the characteristics of a caries-immune person should be reviewed.

Heredity is a characteristic that has been studied sufficiently to show that inheritance appears to be a distinct factor in immunity in animals. Klein and associates suggest the same possibilties in humans. Haldi and Wyman did not find that high sucrose diets, fed to a strain of white Wistar mother rats during the prenatal period of their young, produced young rats highly susceptible to caries as did Sognnaes experimenting with a strain of Norway rats. McClure found that groups of rats of caries-susceptible strains fed on coarse synthetic diets containing excessive quantities of sucrose and glucose developed significant caries and later could not repeat the findings on rats of caries-resistant strains. The ingestion of refined carbohydrates does not produce a significant drop in pH in an immune person's mouth and lactobacilli are not found in the oral cavity and gastrointestinal tract of such a person. Evidence has been submitted that lactobacilli cannot be implanted in the oral cavity of an immune individual. One investigation, at least, has shown that phagocytosis of acid-producing organisms is stimulated in this person; evidence has been published which indicates that the skin of this individual fails to react to an unpurified filtrate from a solution of heat-killed lactobacilli; he fails, also, according to published evidence, to respond with a violent reaction to a vaccine of heat-killed lactobacilli, as does the susceptible person, and, further, an increased agglutinin titer for lactobacilli is experienced by his blood. Changes in susceptibility to caries have been reported for age and sex

FACTOR 2. ACID-PRODUCING AND ACID-TOLERATING BACTERIA

The presence of acidogenic microorganisms and, for long-range activity, aciduric organisms on the surface of a tooth has been listed as the second essential factor for the initiation of caries. For the destruction of the organic portion of enamel, proteolytic bacteria also must accompany or follow the decalcifying organisms, but, as Stephan has pointed out, "It is quite significant, however, that in caries of the dentin the organic matrix remains after decalcification produced by the caries process has occurred. . . ." Barnett and Sherp recently completed research which permitted them to conclude that:

. . . proteolytic bacteria from dentinal caries are able to produce only minimal changes in intact dentin, although they readily digest dentinal protein made accessible by acid decalcification.

The evidence submitted to date regarding the role of acid-producing bacteria in dental caries is scientifically impressive, and some of it now will be reviewed.

Kligler, it may be recalled, focused attention as early as 1915 on the frequency of growth of lactobacilli in the teeth of individuals experiencing active caries and the infrequency of growth of these organisms when no active caries existed. Bunting and Palmerlee concluded in 1925 that aciduric organisms from caries-active mouths produced carieslike lesions in six to eight days. Enright, Frieseli and Trescher reviewed the earlier literature on the microorganisms associated with caries and then summarized their own observations in 1932. They pointed out that the only organism found in food debris in direct contact with enamel as it is being attacked by progressive caries is a lactobacillus. Further, they pointed out, the lactobacillus is the only organism which can tolerate and produce additional acid below a pH of 5.0.

Many additional details regarding the essential oral flora were accumulated during the 1940's. Volker in 1940 demonstrated some variations in the solubility of enamel from deciduous teeth, young permanent and old permanent teeth when exposed to weak organic acid. Bibby, Volker and Van Kesteren in 1942 found, in a study of the reaction of salivas, that streptococci formed ac

most rapidly in incubated glucose-saliva mixtures, that actinomyces ranked second in rapidity and that lactobacilli were less rapid in the production of acidity. The same year, Florestano, having studied the behavior of cultures procured from salivas, reported that 121 strains of lactobacilli produced a pH which varied from 4.9 to 3.6 while 14 strains carried the acidity no farther than a pH of 5.25, that 39 of 68 strains of streptococci produced a pH of 4.0 to 3 that 25 strains of staphylococci produced an acidity of 4.0 to 3.7, and that the lowest pH yielded by 14 yeasts was 5.17.

Canby and Bernier in 1942 concluded that the *Lactobacillus acidophilus* had an important etiologic role in the caries process since carious dentin developed such a H-ion concentration as to exclude ordinary oral streptococci staphylococci and some other organisms which do not possess marked aciduric powers.

Dietz, in his continuous study of the production *in vitro* of plaques and caries, reported in 1943 that lactobacilli and streptococci invariably were recovered from the surfaces of carious lesions, and that occasionally the yeasts and staphylococci recovered throve on a tomato-agar medium.

At this point the question arises, "What is the critical pH for the initiation of decalcification?" In 1925, Bunting and Palmerlee were able to decalcify teeth slowly in lactic acid at a pH of 5.0: McClelland in 1926 produced distined losses of weight in pieces of submerged enamel kept for 12 hours at a pH of 4.5: Enright, Friesell and Trescher in 1932 produced "characteristic carious lesions" by lactic acid, pH 4.6, in 14 days: and Bibby, Volker and Van Kesteren in 1942 found the critical pH of cultures containing enamel and dentin to be 5.0. Stephan, who contributed so much to the knowledge of plaques during the period 1938 to 1948, has established the critical pH under plaques at 5.0 or below.

In 1942 Becks associated high counts of lactobacilli with a high incidence of carious lesions, and Stralfors in 1948 noted that the higher the pH (nearer alkalinity) that is established in dental plaques, the lower the number of lactobacilli present. Jay in 1944, 1947 and 1948 reported in detail on how to rid mouths of lactobacilli by a regime which consisted of low carbohydrate diets, and how, thereby, to halt cavitation. Kitchin and Permar confirmed the results of Jay's technic in a 1948 report.

For more than 10 years, Blayney, of the Zoller Clinic, and his associates made a thorough study of the bacteria found in plaques, and this group has made a large contribution to the knowledge of the bacteriology of the dental plaque. In 1940, Bradel and Blayney determined that lactobacilli, in 392 (82 per cent) of 477 patients studied, were present in 85.4 per cent of samples. In 1942 Blayney and co-workers reported further details of the five-year continuous study of plaques removed from beginning cavities on the proximal surfaces of the young bicuspids of these 477 patients from which 3,299 specimens were obtained. Only 25 per cent of 333 specimens from the 56 caries-free patients studied yielded positive cultures of lactobacilli. Harrison in 1940 reported that streptococci were more numerous than lactobacilli in the mouths of rats on cariogenic diets and, when the caries activity was inhibited by the addition to the ration of fluoride or iodoacetic acid, there was a significant numerical reduction of the lactobacilli while the number of streptococci remained the same. In 1941, Hemmens, Blayney and Harrison published a fairly detailed report of the bacteria in the plaques which had been removed from teeth. The most active producers of acid were found to be cocci and streptococci which developed a pH of 4.0 in 24 to 36 hours. Some of the diphtheroids and fusiform bacilli developed more slowly a pH of 5.0. None of these acidogenic organisms, however, survived in an acid medium of their own ultimate pH. The percentage prevalence of the aciduric organisms isolated in this study was streptococci, 15 per cent: lactobacilli, 41 per cent: micrococci, 15 per cent, and yeasts, 10 per cent. Hemmens and co-workers, in a 1946 report, stated it was true that diphtheroids and aciduric streptococci most commonly were isolated from the material of plaques but did not increase during the initial stages of decay, while hemolytic streptococci and lactobacilli did show a progressive increase during the onset of the lesion. Since the hemolytic streptococci were extremely limited in numbers, they appeared to have little or no role in caries. In 1947, Stephan and Hemmens stated, from further studies, that lactobacilli, diphtheroids, some sarcinae and some streptococci were the only organisms capable of producing a sufficiently low pH rapidly enough to decalcify a tooth. Still later, in 1948, Harrison, from a longitudinal study of over 600 plaques taken from 87 proximal areas of the teeth of 44 children, made a number of observations perti-

nent to the present report: (1) acid-producing and acid-tolerating streptococci both were found associated with dental decay; (2) aciduric streptococci were associated more persistently with advanced caries of the dentin while lactobacilli were found more likely to be associated with the initiation of the lesion in the enamel; (3) streptococci of the viridans type began to disappear in plaques as early as 42 weeks before the first appearance of cavitation and disappeared rapidly with the formation of carious lesions; (4) hemolytic streptococci, found infrequently, showed a slight increase as lesions developed, and (5) yeasts were found in comparatively few cases and did not change with carious progress. Harrison, thus, presents an excellent summary of the knowledge of the bacteriology of dental plaques.

FACTOR 3. ORALLY FERMENTABLE CARBOHYDRATE

One reason that bacteria die or thrive is that they, just like any organic cell, are dependent on the availability of a suitable substrate. As Fosdick and Burrill pointed out in 1943, chemical considerations show that the only substrates from which acids can be formed are the carbohydrates in general and that, in all probability, the fermentable carbohydrates in particular are the ones most likely to be converted to various acids under oral conditions. A number of research people have investigated the role of carbohydrates in the process of caries; their findings warrant a brief review.

Fosdick, Campaigne and Fancher in 1941 reported.

At the present time, most of the evidence indicates that free sugar is the predominant source of acid and that ingested starches do not often influence the susceptibility to decay. . . .

Gaha in 1941 demonstrated a sharp rise in the production of acid in patients' salivas immediately after they had eaten a lump of sugar. In 1942 Bibby, Volker and Van Kesteren concluded.

Since the action of acid is the only known mechanism by which human enamel can be destroyed and since the bacterial fermentation of carbohydrates is the only established source of mouth acids, the ability of various microorganisms to produce acids under mouth conditions becomes the first measure of their probable significance in the causation of dental caries. . . .

Also in 1942, the Council on Foods and Nutrition of the American Medical Association submitted a report on the consumption of sugar:

The per capita gross consumption of sugar in the United States increased steadily from about 10 pounds (4.5 kg.) in 1821 to 108 pounds (49 kg.) in 1931. . . . Sugar, as consumed in recent years, whether it originates from sugar cane or sugar beets is far the most part highly refined sugar. . . .

Accurate information is not available as to what proportion of the total use of sugar is for use with other foods. However, much sugar is consumed in candies, some prepared desserts and sweetened beverages, which carry nothing of nutritional significance except sugar. Estimates of the consumption of candy show that it may be as great as 16 pounds (7.3 kg.) per person each year. . . . Figures are available on sales of sweetened beverages. They indicate that manufacturers of such beverages produced over eighteen billion 6-ounce bottles of soft drinks in 1939. It is also admitted that, since 1939, the consumption of soft drinks has increased by from 20 to 30 per cent. From such data it appears that the per capita consumption of soft drinks may be in the neighborhood of more than three bottles per week per capita. . . . It seems obvious that, regardless of the method used to estimate the amount of sugar consumed as soft drinks, one obtained a result that is definitely undesirable from the standpoint of the nation's nutritional status.

Another report on nutrition by the American Medical Association in 1942 may be quoted:

Sugar is not among the recommended foods. Its recent rationing will not provoke a hardship, for sugar supplies nothing in nutrition but calories, and the vitamins provided by other foods are sapped by sugar to liberate these calories. One of the worst of the many bad food habits that Americans have acquired is their use of sweetened carbonated beverages. Many persons take such beverages by the half pint many times a day with a resultant excessive consumption of sugar.

Beeks, also in 1942, reported a dietary analysis of 99 caries-free and 107 caries-active individuals. The only difference in the dietary intake of the two groups was in consumption of carbohydrates, especially in regard to refined sugars. The caries-active group consumed an average of 7.7 teaspoonfuls more of refined sugars per day than the caries-free group. Jay in 1944 observed that nobody has reported a successful control of human dental caries by dietary means without restricting sugar. McClure in 1945 reported that susceptible white rats, fed on a diet containing 66 per cent of course ground dextrins and on a diet containing 65.5 per cent of starch, developed no cavities, while rats, fed on diets containing 70 per cent of either sucrose or glucose, developed numerous cavities. Non-susceptible rats developed cavities on none of these high carbohydrate diets, however. Lipner in 1947 concluded that an essential condition for caries in man is fulfilled if carbohydrates in the form of monosaccharides or disaccharides are supplied in the mouth, or if salivary amylase is available in sufficient concentration to break down more complex carbohydrates rapidly into forms more utilizable by oral bacteria.

The federal Bureau of Agricultural Statistics in 1949 submitted a report on the consumption of refined sugars in the United States. By 1948, per capita consumption of cane and beet sugar had risen to 95.9 pounds from 73.1 pounds in 1939. During the peak year, 1942, per capita consumption was 103.6 pounds. During 1948, in addition to the 93.5 pounds of refined sugar, per capita consumption of sugar included 1.6 pounds of cane sirup, 0.8 pounds of sorgo sirup, 0.2 pounds of edible cane molasses, 0.2 pounds of maple sugar and maple sirup, 0.3 pounds of refiner's sirup, 1.3 pounds of honey and 8.2 pounds of corn sirup, making an additional 12.6 pounds of highly concentrated sugar foods. A 1952 report of the Bureau of Agriculture estimated civilian consumption of refined sugar per person for that year at a level not to exceed 96.3 pounds.

The policy of the American Dietetic Association concerning candy and sweetened beverages, prepared late in 1952, is of interest. The American Dietetic Association does not accept advertising or exhibits for candy or soft drinks or carbonated beverages. As a professional organization, the American Dietetic Association feels a responsibility to the public in the solution of problems connected with foods and nutrition, particularly with regard to the nutrition of children. It cannot, therefore, accept foods and drinks which may contribute to the nutritional injury of children.

In view of the interest in carbohydrates, from the standpoint of cariogenic property and ability to develop a dietary imbalance, it would appear that a short review of carbohydrates, their types and their metabolism, should be pertinent to the evaluation of the effect of sweetened beverages on teeth.

West and Todd's textbook may be utilized for a limited review of the types of carbohydrates and the manner of their metabolism in the oral cavity. Common practice classifies the carbohydrates in the main as monosaccharides, disaccharides and polysaccharides. The common monosaccharides are glucose, fructose and galactose, while the common disaccharides are sucrose (glucose combined with fructose), maltose (glucose plus glucose) and lactose (glucose plus galactose). Granulated sugar, which is obtained from either beets or cane, is sucrose. The common polysaccharides are (1) dextrins, (2) starches (3) glycogen and (4) cellulose

Dextrins represent products of the partial hydrolysis of starch by acids or amylase (ptyalin) and they occur naturally in the leaves of starch-producing plants and, to some extent, as constituents of such foods as honey or corn sirup. They are soluble in water; they cannot dialyze through a semipermeable membrane.

Starch is a plant carbohydrate with a huge molecule and is insoluble although it may be dispersed in water. It does not diffuse through a selective membrane such as a dental bacterial plaque. With the aid of the salivary enzyme, amylase, starch may be hydrolyzed to maltose to a limited and variable extent in the mouth and in the stomach after being swallowed. The enzyme, maltase (very small amounts of which are found in the saliva, although yeasts are a prolific source) then is required to split maltose into glucose. In all, 14 reactions probably are required to break starch down into lactic acid, and 12 of the steps require an enzyme or source of energy.

Glycogen, which has been called "animal starch," is the form in which carbohydrate is stored in the human liver and muscles. As metabolized in muscle to

lactic acid, it appears to require 13 steps or reactions, making its metabolism quite similar to that of starch.

Celluloses, the fibers of plant life, are insoluble in water and are nonfermentable in the mouth.

A number of individuals have discussed this basic information in contributions to dental literature. Of these individuals, Stephan in 1948 pointed out that, of the carbohydrates which people commonly consume, the monosaccharides and disaccharides generally are fermentable by acidogenic oral microorganisms, they rapidly lower the pH in plaques and carious lesions and they produce caries in rats and hamsters under suitable experimental conditions, whereas the polysaccharides, starch and dextrins, are not fermentable directly by acidogenic oral microorganisms. From laboratory studies of plaques material taken from susceptible individuals, the plaque appears to be able to produce lactic acid promptly from dextrose, maltose and sucrose, but less readily from lactose and starch. Neuwirth and Summerson in 1951 noted experimentally that lactic acid is produced within a few minutes after contact between microorganisms and glucose solutions, and it continues to be produced at the initial rate until all or nearly all of the glucose is metabolized. Neuwirth and Summerson were using a concentration of approximately 0.13 per cent glucose, about that of blood, and much lower than that found in carbohydrate-rich foods. Pigman and Reid in 1952 pointed out that starch components (amylose and amylopectin) are large molecules containing several hundred to several thousand units of glucose which are broken down by amylase quite promptly to short dextrins containing six to eight units of glucose; that is, hexasaccharides, septasaccharides and octasaccharides. These dextrins are hydrolyzed very slowly, however, to monosaccharides, disaccharides and trisaccharides.

In view of the difficulty experienced in breaking down complex carbohydrates, it would appear helpful to the present evaluation if the various types of carbohydrate fractions in a variety of foods could be ascertained. Such information should help assess the possibilities possessed by a carbohydrate to diffuse into a bacterial plaque and to break down into an organic acid promptly. Some information is available. Chatfield and Adams in 1940, McCance and Widdowson the same year, Collins, Jensen and Becks in 1942, the Iowa Dental Bulletin in 1947, Wooster and Blanck in 1950, Watt and Merrill in 1950, Bibby, Goldberg and Chen in 1951, and Lundqvist in 1952, all have studied the percentages of carbohydrates in foods. A composite table of some of these findings would appear to be valuable as a reference (Table 1).

Since some suggestions have been made that naturally concentrated sugars are less cariogenic than refined sugars, it is of interest to examine four findings that have been reported. Steggerda and Hill in 1936 found that the Maya Indians, on a high cereal diet, and the Navajo Indians on a high protein diet, exhibited a very low attack rate for dental caries (more than 50 percent of both groups being caries-free until the age of 20 years). At the same time, Jamaicans (colored), who commonly chew sugar cane, experienced a high caries-attack rate on the smooth surfaces of their teeth. Osborn, Noriskin and Staz in 1937 reported observations on extracted teeth incubated in salivas to which various carbohydrates had been added. These investigators observed that refined sugar produced decalcification in the highest percentage of teeth, that both whole wheat and refined flour produced a high percentage of decalcification and that crude cane juice produced the least. Dreizen and Spies, however, in 1950, found an opportunity to study 147 people from Cuban families who had lived on a diet composed principally of unrefined carbohydrates but who, as cultivators of sugar cane, were habitual cane chewers. In the 137 persons who had complete or partial dentitions, the average caries prevalence was 48.5 surfaces and 15.1 DMF teeth.

Sorbitol, which was obtained originally from the berries of mountain ash and which now can be produced by the electrolytic reduction of glucose, is about one-half as sweet as sucrose. Grubb in 1945 found that it was fermented very slowly by lactobacilli.

Bibby, Goldberg and Chen developed an ingenious technic to study the cariogenic property of foodstuffs. They devised an index of decalcification potential based on the food retained in the mouth after swallowing (removed by brushing or spray from an atomizer) and the acid produced during four hours by food suspensions in saliva. Since decalcification of teeth *in vivo* has to take place under plaques through which large molecules of carbohydrates appear unable to diffuse

promptly, and since a comprehensive system of bacterial enzymes must be available in the individual's mouth for the time-consuming process of breaking polysaccharides down to simple sugars that can be utilized rapidly in plaques, these investigators were loath to suggest that this index be used diagnostically until further work with it had been completed.

Lundqvist in 1952 reported on a long study being carried on in Lund, Sweden, of the time required for the clearance of sugar from the saliva, a study which he utilized to develop an index of caries potentiality for a large group of foods. Briefly, he found that deproteinized fasting saliva was free of sugar in normal individuals and only showed the presence of sugar when carbohydrates dissolved in it during their passage through the oral cavity. He was able to associate increased caries activity with a high content of sugar in the saliva and a prolonged time for clearance of this sugar. On the basis of his index for caries potentiality, he classified such foods as candy, honey and sweetened bread as of highest potentiality. Recently (May 16, 1953) a brief report from the same study at Lund states that "sugar in the form of toffee is more dangerous than sugar in chocolate." It is true that Teuscher and Fosdick in 1937 observed in a study of 85 boys that sugar was retained longer after meals or consumption of candy in the salivas of those boys most susceptible to caries. Volker and Pinkerton in 1942 stated a clearance time slowest after eating sticky candy and fastest after chewing gum. None of these studies, however, provided any information about the clearance time of sugar from bacterial plaques. Hence, the same criticism of the usefulness of the Lundqvist index, for example, may be expressed as for that of Bibby, Goldberg and Chen.

Such observations as those cited point, at least, to the desirability of a review of the essential oral enzymes as the next step in an evaluation of the cariogenic properties of sweetened beverages.

FACTOR 1. APPROPRIATE BACTERIAL ENZYME SYSTEM

An appropriate bacterial enzyme system has been listed as an essential factor in the oral degradation of carbohydrates, inasmuch as amylase (ptyalin) is the only member of this complex system of enzymes found secreted naturally in significant amounts by the salivary glands. A serious interference with this enzyme system, at any level of activity prior to the production of acid, can serve to arrest the process of caries and can provide a technic for the control of caries. Some of the information which demonstrates the essentiality of such an oral enzyme system next will be examined.

Fosdick, as early as 1939, decided, from two weeks of incubation of glucose with tribasic calcium phosphate and saliva at body temperature, that the enzymatic fermentation of glucose produced small amounts of phosphoglyceric, pyruvic, butyric and lactic acids which probably took part in dental caries. In 1940 he reported that the process of degradation of carbohydrates in the mouth was the same or similar to that in muscle tissue during muscular activity and that, in the mouth, the series of enzymes probably was derived from bacteria. He pointed out in cases of rampant caries that a pH as low as 4.0 can be attained in as short a time as three minutes, and that the lactic acid in the material of plaques may increase as much as 200 per cent in the first ten-minute interval following the ingestion of a sugar solution. In 1941, with Campaigne and Fancher, he noted that amylase converts starch to maltose rather promptly but, for a number of reasons, little of the action takes place in the mouth. With Burrill, in 1943, he pointed out that most concentrated sugar solutions produced an immediate drop in pH in caries lesions (927 patients studied) and that 10 per cent solutions of the monosaccharides, fructose and glucose, were the two sugar solutions which produced an initial drop of appreciable magnitude at this level of concentration. In 1948 he stated that 13 chemical reactions were necessary to carry sucrose down to organic acid.

Florestano, Faber and James in 1941 detected an increased diastatic activity of saliva from individuals with carious teeth or with teeth which later became carious. Hubbell in 1944, however, reported no difference in diastatic activity for caries-free and caries-active children. At any rate, diastatic activity may not be truly a part of fermentation.

Barron in 1945 may be quoted:

In summary, the series of eleven enzyme systems (the 8th and 10th steps are nonenzymatic) of the first phase of fermentation is made up mostly of specific

metalloproteins with, in instances, the addition of adenylic acid or its polyphosphates.

Lipner, in 1947, it may be restated, designated, as an essential factor for caries in man, the presence of a monosaccharide or a disaccharide or of salivary amylase available to break complex carbohydrates down rapidly to a form utilizable by resident oral bacteria. Pfeffer in 1948 pointed out that the splitting of the six-carbon chain, once a monosaccharide is achieved, still is a most complicated process, the first step of which involves adenosine triphosphate (ATP) for energy and hexokinase as a catalyst. The resulting products are adenosine diphosphate (ADP) and glucose phosphate. Splitting another section from another ATP molecule and utilizing a different catalyst converts glucose phosphate to fructose diphosphate. Continuing the process to lactic acid, Pfeffer enumerated 12 enzymes altogether which were involved in the fermentation of glucose.

Aitken in 1949 sealed monosaccharides under amalgam in prepared cavities for his study of the process of caries and reached the gloomy conclusion that: . . . as long as the human race will persist in eating carbohydrates, as long as these carbohydrates are capable of being hydrolyzed to the monosaccharide state when present in the saliva, and as long as the tooth tissue remains permeable to these substances, we shall have dental caries.

Kite, Shaw and Sognnaes in 1950 fed 13 rats a caries-producing diet for 16 to 25 weeks and fed 13 other comparable rats through a tube, thus by-passing the oral cavity. They found that non. of the tube-fed rats developed carious lesions and all but one of the 13 controls did. From the results of experiments reported in 1950, Sreebny, Kirch and Kesel concluded that "the acids formed by the action of saliva on suitable substrate occur as a result of microbial fermentation" and that their results "tend to lend credence to the fact that the enzyme systems involved are intracellular," hence, developed within the microorganisms. Weisberger, also in 1950, found that intact human teeth, incubated in a solution containing glucose and mixed organisms from the oral flora, developed a pigmented carious lesion on the exposed surface of the enamel which penetrated the underlying dentin. Calandra and Adams in 1951 postulated that immunity to caries in those who can ingest large amounts of sugar is due to an enzyme system capable of oxidizing some of the intermediate compounds in the degradation of glucose to lactic acid or even of lactic acid itself. *Micrococcus lactilyticus*, they found, was capable of oxidizing lactate rapidly and also pyruvate, acetate and propionate slightly. Pigman and Reid in 1952 pointed out that starch substances (amylose, amylopectins, glycogen) were hydrolyzed relatively rapidly to dextrins (six, seven and eight molecules of glucose) but that these saccharides very slowly are reduced to the simpler monosaccharides, disaccharides or trisaccharides such as glucose, maltose and maltotriose.

In view of the preceding survey of a number of reports which deal with the degradation of carbohydrates, it should be of interest now to summarize the details of this complex process. West and Todd's textbook will be used as the source of this summary of the degradation of starches.

The necessity for ten enzymes (and a number of coenzymes) in order to initiate the activity at the various levels by which the process of degradation of glucose to lactic acid takes place points to at least ten stages in which enzymatic inhibitors might prove effective for interfering with dental caries. A substantial amount of research has been devoted to the development of such inhibitors as agents in the control of caries. Should some of them prove effective, the finding would lend further stature to the previously stated essentiality of an appropriate enzyme system in the process of caries.

The researches of Calandra, Fancher and Fosdick in 1944, Burrill and others in 1945, and Calandra and Adams in 1950, indicate that enzymatic activity of saliva is blocked in the laboratory or mouth by various forms of the naphthoquinones. In 1943, Stephan, in 1942 and 1943, Hine and O'Donnell, in 1946, Kesel and others, and, in 1952, Rae reported separately interference with enzymatic activity by carbamide (urea), urease-producing bacteria, and carbamide-quinine. Weisberger in 1946 and Dreizen, Green and Spies in 1947 found that the absence of the vitamin B fractions, thiamin and nicotinic acid, appeared to interfere with salivary production of acid. Dreizen and others in 1947 completed research which indicated that sodium bisulfite interfered with salivary production of acid, in 1947, Calandra and Fosdick, Kesel and others, Mann and others and Turner and

Crowell and, in 1948, Dreizen and Spies, and, in 1950, Koser and Fisher submitted reports of research with amino acids which showed that the presence of certain of these protein fractions in saliva reduced the production of acid. Fosdick and Calandra in 1947 completed some promising laboratory studies with organic peroxides and glyceric aldehyde which indicated that glyceric aldehyde shou'd be an active inhibitor of an enzyme involved in the degradation of sugars. Shaw, however, in 1950, found it ineffective in the reduction of caries in rats. In 1950, Forbes, Cox and Smith noted that hendecynoic acids and their ammonium salts reduced the production of acids in glucose saliva mixtures. In 1949, Hill and Kulesner reported no significant reduction in caries activity by the use of a penicillin dentifrice. In 1950, Zander, as well as Fitzgerald, Zander and Jordan, found that penicillin reduced the development of new cavities in study groups of patients. Ludwick, Fosdick and Schantz in 1951, experimenting with enzymatic inhibitors in dentifrices, found 0.07 percent penicillin the most effective of the agents studied. Hill, Sims and Newman in 1952 found no significant changes in caries activity as the result of the use of a penicillin dentifrice when an experimental group of boys was compared with a control group.

Obviously, the possibilities of the practical utilization of enzymatic inhibitors appear promising but their usefulness in the control of human dental caries is yet to be demonstrated. It may be that Fosdick, Ludwick and Shantz, in 1951, while they were studying the extent of retention of these inhibitors in bacterial plaques, pointed out the reason for limited successes *in vivo* to date. Presumably, the inhibiting agent not only should diffuse into the bacterial plaque but should be retained there for an appreciable period of time in order to serve as the basis for a practical technic of caries control. This finding, at least, highlights the importance of a thorough presentation of the evidence for the essentiality of the bacterial plaque during an appraisal of the effect of sweetened beverages on teeth.

FACTOR 5. BACTERIAL PLAQUE

Williams and Black, it will be recalled, pointed out the importance of the bacterial plaque in the process of caries in the early 1890's; Williams, in fact, in a study of over 400 cases, found that, invariably, caries resulted from acids generated in the mouth under a feltlike mass of microorganisms. Miller in 1902 reported that "films and caries must occur together." Bunting and Rickert's extensive study of oral bacterial plaques in 1914 led to the conclusion that:

> . . . films or colloidal coatings are found upon all teeth; and that they play an important part in the chain of factors which, by their balance, determine the process of caries.

Since these early observations of the essentiality of an adherent bacterial plaque as one of the factors in the process of caries, many investigators have added information about the behavior of dental plaques. Inasmuch as the dental plaque appears to be such an important mechanism in the process of caries, since the bacteria and acids involved have to be protected by it and since a number of salivary agents which modify caries have to penetrate this barrier, information about the oral bacterial plaque will be reviewed in regard to (1) structure, (2) bacteriology, (3) behavior as a selective membrane and (4) acidity.

Structure of the Dental Plaque.—Of the earlier investigators, Williams, Miller and Bunting and Rickert, all pointed out that the long, threadlike actinomycetes, leptothrix and cladothrix, appeared to serve as the basis of the plaque, that these threadlike forms entrapped oral debris and provided a shelter for a number of smaller organisms in the mouth. Bunting and Rickert pointed out that there was considerable difference in their rate of attachment but, in many cases, a thick, adherent growth would develop in 24 hours.

Bradel and Blayney in 1940, studying ground sections of enamel, reported that the plaque grossly was a "felt-like mass with long filamentous forms protruding." Miller, Muntz and Bradel, the same year, stated that the dental bacterial plaque was a thin film which adhered tenaciously to a tooth and could not be removed by a stream of water or by ordinary swabbing or brushing; that, microscopically, it appeared as a mass of small bacteria embedded in a matrix of filamentous microorganisms, the bacteria supplying perhaps half of the total bulk. Dietz in 1943 watched microscopically the development of the plaque. He found that leptothrichoid and oidiumlike organisms served as the base of the plaque, becoming a thin plaque in one day under which initial etching of the enamel would

take place one-half hour after the proper carbohydrate was applied. In 1948 Ennever, Robinson and Kitchin procured bacterial plaques on celloidin ponties inserted in the human mouth and found that new plaques contained a multitude of filamentous organisms, parallel to each other and perpendicular to the surface roughly at right angles. Bruckner studied plaques in vitro he obtained by suspending sheets of cellophane in a saliva-glucose mix three weeks. He noted the matrix of threadlike organisms and summarized briefly current knowledge of the structural characteristics of the dental plaque, about the same as Miller, Muntz and Bradel had done earlier. The plaque is

. . . a thin, adherent film, white and cloudy in appearance, present on improperly cleansed tooth surfaces, and consisting of microorganisms and debris that is primarily of organic nature. It cannot be removed from the tooth surface by a stream of water or by gentle swabbing, but can be removed by vigorous brushing, especially with the aid of a mild abrasive.

Bacteriology of the Dental Plaque.—The bacteriology of the dental plaque was reviewed earlier in connection with Factor 2, acid-producing bacteria. It appears significant to recall at this point, however, that Hemmens, Blayney and Harrison in 1941 and Hemmens and others in 1946 found lactobacilli present in high percentages during the period of initiation of caries and that only lactobacilli and a few hemolytic streptococci survive in their own lowered pH. Stralfors in 1948, it should be noted, found a statistically significant relationship between a minimum pH and the number of lactobacilli.

Behavior of the Dental Plaque as a Selective Membrane.—In 1932 Dobbs made a thorough study of the behavior of plaques removed from teeth by moistening with 5 per cent hydrochloric acid. With the plaque sealed to a diffusion apparatus he found that the salivary buffers (carbonates and phosphates) and the viscous, amphoteric, salivary mucin did not pass such a membrane but that soluble carbohydrates did pass through rapidly at the rate of 3.2 mg. per day. Pincus, working with a somewhat similar membrane obtained from the surfaces of newly erupted teeth, reported in 1937 that the enamel cuticle (Nasmyth's membrane), when placed over windows in glass slides, permitted the dialysis of crystalloids but not of colloids. One, 5 and 10 per cent lactic acid, cystine, sucrose and sodium chloride passed through but starch, gums, dextrins and proteins, which do not crystallize, did not dialyze through the membrane.

Dietz in 1943 noted that the buffer capacity of saliva was no lower in the mouths of caries-active than in the mouths of caries-free individuals, and hence that some form of protective covering would have to be present on the surface of an affected tooth. Others then demonstrated the selective permeability of the dental plaque to a number of substances. Stephan and Miller in 1943 demonstrated that glucose penetrates such a plaque promptly; the same year, they showed that Zephiran and Phemerol penetrated plaques and interfered in the expected drop of pH in an inverse relationship to the thickness of the plaque. In 1943 Stephan also showed that urea in concentrations of 1 to 50 per cent would penetrate the dental plaque readily; again in 1944 Stephan and Miller demonstrated that Zephiran and saturated solutions of urea would penetrate plaques; in 1943 Muntz and Miller also showed that glucose and urea penetrated the dental plaque; in 1948 Bruckner, reporting on the selectivity of bacterial plaques developed on cellophane sealed over 6.9 mm. glass tubes, stated that the plaque permitted the passage of sodium bicarbonate at a reduced rate; and Fosdick, Ludwick and Schantz in 1951 reported the passage and prolonged retention of penicillin in the plaque.

Acidity of the Dental Plaque.—Research reported by Etherington and Trimble in 1934 indicated that "in every instance the plaque interior was more acid than the corresponding saliva." In 1938 Stephan, it may be repeated, determined that the pH values of 211 plaques varied from 4.6 to 7.0, while in 1939 Miller and Muntz reported that the amount of acid in 15 human carious lesions varied with the soluble calcium and phosphorus present. Again, too, it may be repeated that Fosdick and Starke pointed out in 1939 that the pH of an individual's saliva can be too high for decalcification to occur while, at the same time, the pH in a bacterial plaque becomes so low that decalcification takes place.

Stephan in 1940 reported in detail the effects of 10 per cent glucose rinses on bacterial plaques when measured in patients' mouths. The average maximum variation found was 2.0 pH units. In 15 minutes after the rinse, all plaques measured showed a pH of 5.0 or less and, about two hours later, approached their

original pH. A second glucose rinse repeated the same finding. Since the greatest intensity of reduction of the pH in plaques was reached during the first 30 minutes and was gradually overcome during the next two or three hours, it appears that the repeated renewal of a carbohydrate which can diffuse into the plaque is important in the development of a cavity. In 1940 Miller, Muntz and Bradel demonstrated that plaque material removed from teeth produced lactic acid readily from sucrose and maltose but to a much lesser degree from lactose, indicating that milk, from a cariogenic as well as a nutritional standpoint, appears to be a more desirable beverage than a sweetened drink for a school lunch.

The work of Muntz in 1943 confirmed that a maximum acidity is produced in plaques by dilute glucose solutions in 30 minutes, but that acidity in incubated saliva probably is buffered within 30 to 90 minutes. Stephan in 1948 found that a . percent glucose solution introduced into the mouths of caries-free patients produced a drop in the pH of their bacterial plaques but never below 5.0, while a drop to 4.0 occurred promptly in the caries-active person's mouth. Stralfors in 1948 observed that the plaque appears to have the ability to store acid and to hinder the saliva from neutralizing it. O'Glynn in 1949 reported that only eight hours was required for lactic acid, in concentrations detected in dental plaques, to penetrate enamel. Neuwirth in 1950 found that citric acid was not produced from the action of oral microorganisms on glucose. Recently (1952), Fosdick has published a stimulating review of the behavior of dental bacterial plaques, and has listed speculations which might explain the variance in pH determinations reported from studies which have been pursued.

The work reported by Stephan in 1944 seems so important to an understanding of the role of the bacterial plaque and so important to a proper appraisal of the cariogenic properties of sweetened beverages that some of his report is repeated at this point:

Since most of the work which has been reported on acid production by mouth bacteria has not simulated conditions in the mouth, it is worth pointing out some essential differences between such studies and the experiments described here. The bacteria growing on tooth surfaces exist in concentrated masses or "plaques" which possess a maximum concentration of enzymes and coenzymes in a minimum space with minimum buffering capacity. The acid production by such bacterial masses is very rapid when carbohydrate is available and, since little initial buffering capacity must be overcome, the drop in pH is likewise very rapid . . .

The subjects (65 in number) were seated in a semi-reclining position in a chair equipped with a headrest. They were instructed not to talk during the test. The labial surfaces of the upper and lower interior teeth were generally chosen for the tests because of their accessibility. In some of the caries-active individuals, particularly those in Group V (8 in number), the enamel was etched or cavities existed under the plaques on these tooth surfaces. Direct pH determinations were made on the tooth surfaces with a polished-stick antimony electrode using a vacuum tube potentiometer. . . . The mouth was rinsed with 25 c.c. of a 10 per cent aqueous solution of glucose for two minutes following initial pH determinations. The pH determinations were repeated two minutes after the glucose rinse and at 10-minute intervals thereafter until the pH had returned to approximately its original value.

Before the application of glucose, the pH values of most areas were around neutrality except in the cases of extreme caries activity, in which pH values were generally considerably lower. In all cases there was a sharp drop in the pH of bacterial material on teeth following rinsing the mouth with the glucose solution. The drop in pH was greatest and lasted the longest time in the caries-active cases.

. . . Only in the caries-active cases were pH values below 5.0 consistently produced by the glucose.

Recently a report by John Haldi and Winfrey Wynn has been prepared for publication. On the basis of their study, findings were presented which indicated that drinking (5 unscreened subjects) or rinsing the mouth (8 subjects screened for rampant caries) with a 10 per cent solution of sucrose did not produce a sufficient drop in pH to initiate decalcification of the surface of a tooth—a finding quite opposite to Stephan's observations with 65 carefully screened subjects (4 categories).

It is of interest to note that Haldi and Wynn report no significant differences in the pH developed from drinking or from rinsing out the mouth with a 10 per cent solution of sucrose.

It was suggested at the beginning of this report, once the primary etiologic factors in dental caries were established and documented and once the importance of the dental bacterial plaque was discussed thoroughly, that the role which sweetened beverages may play either in decalcification or caries of the teeth should be explored. The possibility of decalcification of the teeth will be examined first.

Sweetened Beverages and Decalcification.—It would appear that the pH of sweetened drinks and the pH which they can induce in saliva should have an important bearing on an appraisal of the effects of these solutions. Their acidity, therefore, will receive first consideration.

Restarski, Gortner and McCay in 1945 and McCay and Will in 1949 reported the analysis of a cola drink, for example, at the Naval Medical Research Institute in Bethesda, Md. It was "found to contain 10 per cent by weight of sucrose and 0.55 per cent of phosphoric acid (H_3PO_4). Electrometric pH measurements showed it to have an acidity equal to pH 2.6." In view of this reported analysis which may serve as a pattern, it appears advisable to present information about some of the prepared drinks and the natural fruit juices (their pH, percentage of acid and percentage of sugar) prior to any attempt to assess their potentialities for damage to human teeth. Bridges and Mattice in 1939, Chatfield and Adams in 1940, McClure in 1943, Haggard and Greenberg in 1951, and Miller in 1952 contribute some of this information.

Some of the comment on the decalcifying effect of acid beverages now may be presented chronologically. McClelland, commenting on the dissolution of enamel in 1926, presented evidence that a definite loss of weight in pieces of enamel submerged in a solution with a pH under 4.5 takes place within 12 hours, and that decalcification occurs very rapidly in ranges of pH 1.0 to 2.5 (Bridges and Mattice determined the range for a cola beverage as pH 2.4 to 2.65). McClelland concluded from his study:

> Certainly the presence of a reaction of 3.5 and below, even if existing for only a few minutes, is a potential source of damage to teeth.

Miller and Nonwirth in 1935 reported their observation of cough drops (80 per cent sucrose) and flavored disks (96 per cent sucrose) and flavored hard candies (99 per cent sucrose) held in the mouths of five adult patients daily until dissolved in the saliva. All experienced extravagant decalcification of their teeth.

West and Judy in 1938 reported a somewhat similar study. They stated:

> When an individual places a piece of ordinary acidified candy in his mouth and allows it to dissolve slowly against his teeth, the concentration of the solution at the surface of the candy (and in contact with tooth enamel) will be very high with a probable pH of 3.4. . . .

They reported further that 10, 20, 40 and 60 per cent water solutions of orange, lemon and lime drops provided an initial pH of 2.5 to 2.8 (slightly less acid than the cola beverage) and that 40 per cent solutions in saliva developed a pH of 3.4 to 3.7 as compared with 40 per cent solutions of sucrose in saliva which developed a pH of 3.2. They concluded that repeated use throughout the day leads to serious decalcification.

Bridges and Mattice in 1939, reporting pH values of representative foods, commented that the least acid were bananas, figs, papayas, watermelons, cantaloupes and avocados with a pH of 5.0 to 6.0+; while those below pH 3.0 were some grapes, plums, some grapefruit juice, cranberry juice, limes and lemons. In a concluding statement, they reported:

> It is possible that the future will demonstrate that the pH of food is of little moment. Presumably the most important factor is the property of the individual food in stimulating the flow of gastric juice whether this be attributed to hydrogen-ion, to other constituents in the food, or to products of digestion. . . . None approximate normal gastric acidity at the height of digestion (pH 1.6-1.8).

Bridges and Mattice, of course, were not dentists.

Trask, Ziegler and Maloof in 1940 reached five conclusions about the decalcification of fragments of freshly extracted teeth following quantitative studies of five-days' exposure to the dripping of a variety of solutions:

1. Starches and sugars per se do not decalcify teeth, but lactic acid formed from them may do so.
2. Acid foods having a pH of about 4 or below may prove to be the most important factors in dental decalcification.

3. Other acids than lactic acid in foods have been shown to cause extensive decalcification of teeth.

4. Many commonly used foods are acid and have a pH from 4 to 2.05.

5. The alkalis studied do not demineralize teeth.

McClure in 1943 found hydrochloric acid, pH 1.5, more destructive of rats' molars than lactic acid, pH 2.4, but citric acid. pH 2.5, lactic acid, pH 3.0, and lactic acid, pH 4.0. also would erode rats' teeth. He experimented with young rats who were limited in their drinking of fluids (changed each 24 hours) to ginger ale, cola drink, grapefruit juice and cranberry juice cocktail. All rats on these acid beverages experienced decalcification of their molars. The control rats. drinking water, did not experience this decalcification

McCay, Gortner and Restarski and Restarski, Gortner and McCay in 1945 reported:

In an initial experiment, some extracted human teeth were immersed in a common "cola" beverage. When first inspected after two days' immersion the enamel surfaces were found to be grossly decalcified.

Severe destruction of the enamel on the molars of white rats (200 rats) was produced by allowing the animals to drink the popular soft beverage for periods of five days or more. . . .

Preliminary observations on six puppies showed that consumption of soft drinks (500 c.c. per day) also produced gross and microscopic changes on their deciduous teeth.

Bieri and others in 1946, proceeding on the assumption that limited amounts of acid beverage would produce erosion of the teeth of rats, dogs and monkeys, tested this assumption in an experimental situation. They reported:

1. Drinking of an acetic acid-sucrose solution of pH 2.6 for 1–2 weeks produced mild to moderate etching of rats' molars. Orange juice of pH 3.7 decalcified the teeth severely in two weeks. Solutions of pH 4.5 caused no etching when fed for two weeks.

2. The permanent teeth of dogs drinking a phosphoric acid-sucrose solution of pH 2.6 for 130 days showed etching of the enamel. . . .

3. Consumption of 16.5 ml. daily for one month of phosphoric and citric acid solutions of pH 2.6 produced noticeable erosion of the deciduous teeth of young monkeys.

Stafne and Lovestedt, at the Mayo Clinic in 1947, reported their observations of the oral conditions of patients examined in this Clinic. Fifty patients who were using lemon juice as a therapeutic measure showed evidence of dissolution of tooth structure. They continued their report:

Restarski and co-workers stated that the results of their observations on animals (drinking a popular cola beverage) did not justify their making any definite conclusions as to what effects ingestion of acid beverages might have on the teeth of man. We have observed in some cases, however, destruction of enamel which we believe can be ascribed to the habitual use of acid beverages.

In 1948, Wynn and Haldi summarized their observations of experiments with rats:

Erosion in the lower molar teeth of the albino rat resulted from the daily ingestion of each of the following canned fruit juices when they were served as the sole fluid intake over a period of 160 days: apple. grape. orange. tomato. sweetened grapefruit. pineapple, prune.

The greatest amount of erosion occurred in the teeth of the animals on apple. grape and grapefruit juice. and the least in those of the animals on tomato and prune juice.

Erosion of a milder degree also resulted from the ingestion of tomato. orange and sweetened grapefruit juice 3 times a day for 200 days.

Complicating the interpretation of studies of decalcification are the findings of Brudevold in 1948. He found that there was a distinct difference in the solubility of powdered enamel and intact enamel. of different surfaces of the same tooth. of outer and inner levels of enamel from the same tooth, and of enamel from deciduous and young permanent teeth when compared with older permanent teeth. The values obtained from different laboratories presumably will vary accordingly.

McCay and Will in 1949 became interested in the dental effects of soft drinks which were claimed to have a retail value annually in excess of $700,000,000. and they tested the pH produced by a cola beverage in the salivas of 32 young officers at the Naval Medical Research Institute. Ten milliliters of the beverage

were held in each mouth, agitated for 30 seconds and then expectorated. The range in pH of the saliva and solution recovered varied from 2.8 to 5.6.

Hicks in 1950 and again in 1951 reported the effects of the daily ingestion of large amounts of citrus fruits and juices on a group of patients, selected because of periodontal irritation or "sensitive" teeth. One of the four patients with sensitive teeth ate daily large portions of sliced fruit salad and drank eight ounces of orange, tangerine or tomato juice. The decalcification of this patient's teeth was similar to that in the teeth of the patients described by Stafne and Lovestedt.

Haggard and Greenberg in 1951 concluded that the ingestion of carbohydrate-containing substances did not cause significant acidity of the saliva, although acidulated beverages such as common fruit juices or soft drinks did result in salivary acidity for short periods. They concluded, further, that decalcification of the exposed surfaces or sheltered areas of teeth by the action of fruit juices or soft drinks appeared unlikely in the amounts normally consumed. Their final conclusion may be quoted:

It is true that there are, in fact, persistent areas of carbohydrate and corrosive acidity on sheltered surfaces of the teeth and under plaques which are protected from dilution and neutralization by the saliva; it would be expected that this protection would also operate against further acidification by the brief tides of acidity occurring in the saliva after ingestion of the acidulated beverages.

Inasmuch as the evidence submitted earlier in the portion of the present report dealing with bacterial plaques does indicate that a number of acids can diffuse into bacterial plaques, this latter assumption appears not to be borne out by scientific observations.

Elsbury in 1952 tested the action of comparable solutions of hydrochloric, nitric, sulfuric, acetic and citric acids on exposed surfaces of extracted teeth. He concluded:

The results suggest that dental erosion of this kind is mainly controlled by the pH of the solution, and is independent of the concentration of the solution by weight. The rate of attack varies, however, from acid to acid due to specific properties of the acids themselves. Noteworthy is citric acid which is more than twice as destructive as hydrochloric or nitric acid.

Gortner and Kenigsberg in 1952 experimented with 28 white rats who were given daily 20 milliliters of grapefruit juice sweetened by 10 per cent of sucrose, and 25 rats given grapefruit sections, similarly sweetened and in daily amounts to provide 20 milliliters of juice. At the end of one week, the animals were sacrificed and the lower molars scored for decalcification on the basis of zero for "no effect" to six for "extensive destruction." The average tooth scores for the juice was 3.8 and for fruit sections 1.5, showing a higher rate of decalcification by the juice. To check the possibility that chewing stimulated a greater flow of saliva and hence more buffering, eight desalivated rats were tested similarly, and it was found that the teeth still experienced the same amount of decalcification.

Soifer in 1953 reported on a patient who had used excessive vinegar when she was between 15 and 25 years of age. This patient exhibited extensive erosion of the labial surfaces of her maxillary incisors.

At this point, it would seem, some legitimate conclusions about the decalcifying effect of sweetened beverages and acid fruit juices should be submitted. It would appear, from the evidence, examined (1) that a number of soft drinks possess a high degree of acidity as is shown by their unusually low pH, (2) that a number of fruits and fruit juices provide a pH below the critical point for the decalcification of enamel, (3) that decalcification does occur when either are consumed in large amounts or at frequent intervals and (4) that such decalcification should not be significant unless abnormal amounts of such drinks are consumed.

Sweetened Beverages and Caries.—The final task of this report is to examine the cariogenic properties of soft drinks. The essential role in the process of caries of fermentable carbohydrates already has been stated and documented. In addition, the necessity for the introduction into the oral cavity of a carbohydrate which can be degraded promptly to lactic acid by the bacterial enzymes produced in caries-active mouths has been pointed out as a part of this documentation. Furthermore, an adherent, selective bacterial plaque has been shown to be necessary in the formation and development of carious lesions in enamel, and the evidence of the ability of simple sugar solutions to penetrate into dental plaques

promptly and to be utilized almost immediately after their ingestion has been summarized and documented. Finally, it should be noted that any cariogenic property to be ascribed to a sweetened beverage, such as the cola drink already discussed, must be based on the behavior of a 10 per cent or less solution of sucrose or other readily fermented sugar. A brief, chronological review of some pertinent conclusions of investigators of the damaging potential of sugar solutions now appears to be in order.

In 1937, Fosdick, Hansen and Epple found that saliva stimulated by chewing gum (in order to provide sugar in solution) could be incubated with the powdered hard tissue of teeth and could produce decalcification of these tissues. They obtained similar results by adding 5 percent glucose. This finding was incorporated into a test for caries activity.

In 1942 the Council of Foods and Nutrition of the American Medical Association presented a report on wartime nutrition that appears appropriate to the present evaluation. Some of the final statement will be quoted:

However, even with soldiers and sailors supplied with satisfactory rations, the tendency to say in effect "Let's give the boys what they want: it isn't going to hurt them," if allowed to go to the extent of permitting the indiscriminate use of soft drinks and candy, will undermine efficiency. Indiscriminate and uncontrolled supply of poor food for between-meal eating cannot be condoned with impunity anywhere.

The Council then submitted the final opinion:

From the health point of view, it is desirable especially to have restriction of such use of sugar as is represented by the consumption of sweetened carbonated beverages and forms of candy which are of low nutritional value. The Council believes it would be in the interest of the public health for all practical means to be taken to limit the consumption of sugar in any form in which it fails to be combined with significant proportions of other foods of high nutritive value.

Jay in 1944 and again in 1947 stated bluntly from years of experience that no foods prepared with sugar are to be used during the first four weeks of control of an individual's caries by dietary means. The following statement encompasses his sixth specific suggestion for the planning of daily menus:

Do not use the following: Confections of any kind; chewing gum; beverages prepared with sugar, similar to those served at fountains, and other soft drinks sold in bottles, chocolate milk and chocolate drinks. The use of sugar-coated pills and cough sirups should be restricted whenever possible. Avoid dentifrices and mouthwashes sweetened with sugar.

Jay, it must be noted, has succeeded in arresting the caries activity index consistently in over 80 per cent of his patients—83.4 per cent of the 809 patients listed as participating in the control diet for the first two weeks in his 1947 report.

Becks, Jensen and Millarr in 1944 obtained similar results by restricting patients temporarily to a low-sugar diet in which they eliminated:

Sugar in and on foods, all concentrated sweets, such as jams, jelly, sirup, honey, raisins, dates, figs, prunes, currants, and canned fruits and candy, chewing gum, confections, pastries and sweet beverages.

Of 1,228 patients experiencing rampant caries whose condition had been followed for one to four years, caries was halted in 1,004 (81.7 per cent). Of these patients, 499 were observed for one year, 111 for two years, 15 for three years, and six for four years, to establish that caries activity had ceased.

Kitchin and Permar in 1948, with similar low-sugar diets prescribed for 216 caries-active patients (10,000+ lactobacillus counts), obtained a satisfactory reduction in the number of oral lactobacilli during the restricted initial two-week diet. Of these patients, 192 progressed to diet plan two (more starch permitted) for two weeks and 80 per cent maintained their low counts.

Anderson and others in 1948 found more cavities in cotton rats who were fed dried milk than in those who were fed fluid milk, and concluded, in the cotton rat, that fluidity was an important factor in caries. However, both groups experienced considerably less caries than those animals fed on a regular dry cariogenic diet.

Volker and Pinkerton in 1947 reported:

Appreciable acid production has been observed to take place within fifteen minutes in mixtures of glucose, sucrose and concentrated salivary debris of carious persons. Various raw carbohydrates have been shown to be converted to acid at rates similar to those observed for refined sugar.

In this report, they also postulated that the salivary clearance time of glucose should be implicated in the process of caries as did Lundqvist in 1952. Boyd and

Speer in 1950 determined the concentration of glucose in the saliva of laboratory workers after the slow ingestion of (1) sweetened beverage (one bottle), (2) 150 cc. of freshly squeezed orange juice, (3) four crackers, (4) one scoopful of vanilla ice cream and (5) three figs and sirup. Figs and crackers yielded the greatest amount of glucose and this glucose persisted longest in the salivas. The peak level was maintained for a short period only and returned to fasting levels in 10 to 20 minutes. Unfortunately, in none of these reports was the clearance time of sugars from the highly important bacterial plaque determined.

Neuwirth and Summerson in 1951, as already has been reported, found that glucose in solutions, as dilute as 0.13 per cent, was transformed practically immediately by oral organisms to lactic acid. They concluded:

If such food material were to be held within the oral cavity for more than a minute or two, in contact with saliva, our data indicate that a significant proportion of the glucose present might appear as lactic acid. . . .

Stephan, whose important contribution to the knowledge of the degradation of glucose under bacterial plaques will be reviewed again in a moment, found that a 10 per cent glucose solution could be retained in a plaque for 90 to 180 minutes after the mere rinsing of the mouth with the solution.

Miller, of the University of Hawaii, in 1952 studied the five-day erosive action of fruits, fruit juices and soft drinks on rats' molars. He reported (1) that fruit juices had greater erosive effects (three to 17 times) than the fruits themselves, (2) that carbonated drinks, on the whole, produced less effect than noncarbonated prepared beverages, (3) that acid-flavored candy dissolved in water exerted the same decalcifying effect as two prepared noncarbonated beverages, (4) that citric acid, which had a marked erosive effect on enamel when used alone, lost that marked effect when it occurred naturally in fruit, and (5) that a cola drink exhibited a pH of 2.5 to 3.0 in 1948 (2.5 in Ithaca, N.Y.) and exhibited a pH of 3.0 in 1949. Miller concluded:

Although no one has proved that enamel erosion is conducive to the carious process in human teeth, it seems reasonable to assume that overindulgence in acid beverages of various kinds might cause defects in the enamel of human teeth in situ. . . .

McClay in 1952 fed white rats milk, sweetened water (10 per cent sucrose), coffee, and tap water to see if the fluid taken by rats interfered with their health or growth when the basal diet was kept adequate. On the sweetened water, the rats developed more than two decayed molars per rat; none developed in the rats drinking milk only.

Haldi, Wynn, Saad and Sognnaes in 1953 fed diets in different ways to three groups of albino rats (Wistar strain) for 90 days after weaning. Group I (eight rats surviving) received their entire ration by stomach tube and developed no cavities in their teeth; Group II (13 rats surviving) ingested granular sucrose orally and the balance of the ration by stomach tube and developed an average of 4.9 cavities per rat or 5.8 cavities per caries-active rat (11 rats), and Group III (13 rats surviving) ingested a 40 per cent solution of sucrose orally and the balance of the ration by stomach tube and developed an average of 0.8 cavities per rat or 1.7 cavities per caries-active rat (six rats).

Stephan in 1940, Stephan and Miller in 1943, and Stephan in 1944 were among the first to test the behavior of a 10 per cent solution of sugar (used as a mouth rinse) in an adherent bacterial plaque. Such a test provides information about the degradation of a sugar solution as it actually has to take place in the human mouth in the process of producing a cavity. In 18 minutes after the rinse (within two minutes in the most caries-active mouths), all plaques were at a pH of 5.0 or less. The acidity reached its greatest intensity within the first 30 minutes and was overcome gradually until little acid effect remained in two to three hours. The renewal of the 10 per cent sugar solution by another rinse of the mouth repeated the same effect. It might logically be assumed that repeated exposure to a beverage containing 10 per cent sugar would produce the same effect.

It would appear from the evidence submitted regarding the behavior of dilute sugar solutions in dental bacterial plaques and the necessity of eliminating such solutions in the dietary control of caries, that the cariogenic property of sugar solutions has been established. Furthermore, it would appear that the dental profession and other interested agencies have a responsibility in warning the public of the cariogenic possibilities of sweetened beverages, at least until their precise relationship to human dental caries has been defined by acceptable controlled clinical studies.

SUMMARY

Because of the length of such a documented report it may be helpful to provide a brief summary of its various areas in order to bring together the conclusions which reasonably may be achieved.

1. Five essential factors in the process of human caries have been reviewed and documented. They are (1) a caries-susceptible individual, (2) the presence of acid-producing and acid-tolerating microorganisms in the oral cavity, which are (3) capable of producing an optimum oral bacterial enzyme system for the prompt degradation of simple sugars to acid, (4) the availability of orally fermentable carbohydrates and (5) bacterial plaques adherent to the surface of the enamel of teeth.

2. Several additional factors which may contribute to the process of caries also have been listed without thorough documentation.

3. The behavior and essentiality of the dental bacterial plaque, through which sugar solutions must operate in caries, have been presented and documented in considerable detail.

4. The decalcifying effect of sweetened beverages and fruit juices has been examined in sufficient detail to warrant certain conclusions:

(a) Research has shown that some sweetened drinks and some natural fruit juices decalcify teeth because of their acidity.

(b) Decalcification has been observed when either are consumed in large amounts or at frequent intervals.

(c) Decalcification probably should not be significant unless such solutions are consumed in large amounts or at frequent intervals.

(d) Fruit juices provide some of the valuable food elements of human diets, while prepared soft drinks provide nothing but calories.

5. The examination of the scientific literature on the cariogenic properties of soft drinks and fruit juices also justifies a number of conclusions:

(a) Any sugar solutions, in order to stimulate caries, must be capable of diffusing into the adherent dental bacterial plaques on teeth.

(b) Available evidence indicates that starchy carbohydrates are of minor importance in the process of caries since complex carbohydrates cannot diffuse into bacterial plaques and cannot be degraded promptly to simple sugars in most mouths.

(c) Monosaccharides and disaccharides diffuse readily into bacterial plaques.

(d) The retention time of carbohydrates in the saliva appears of much less importance in the caries process than the retention time of simple sugars in bacterial plaques and the inability of the saliva to contact rapidly and buffer the acid produced in plaques.

(e) It has been demonstrated that solutions of simple sugars are degraded promptly to lactic acid by the bacterial plaques of caries-active individuals.

(f) This production of acid from retained solutions of sugar may continue in plaques for one-half to three hours following a brief rinse of the patient's mouth with a 10 percent solution.

(g) The dental plaque appears to have the ability to store acid and to hinder the saliva from neutralizing it.

(h) The pH of an individual's saliva can be too high for decalcification to take place while, at the same time, the pH in a bacterial plaque becomes so low that decalcification occurs rapidly.

(i) Solutions of some natural sugars, such as lactose, and sorbitol are fermented with difficulty in the human mouth.

(j) Data regarding the cariogenic potentialities of solutions of simple sugars that are derived from studies of laboratory rats must be appraised critically by dentists since great variations in susceptibility to caries exist for a number of strains of these animals and findings can be prejudiced merely by the selection of the strain of animal and the physical qualities of the diet which he is fed in an experimental situation.

CONCLUSIONS

1. The dental profession and other interested agencies have a responsibility to warn the public of the cariogenic property of sugars and their solutions and to point out that many of these products contain no highly important nutritional factors.

2 Research should be encouraged on the part of producers of sweetened beverages and confections to support the development of new or improved procedures or agents for the prevention and control of dental caries which may result from the use of their products.

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FURTHER OBSERVATIONS UPON THE CARIES-PRODUCING POTENTIALITIES OF VARIOUS FOODSTUFFS

By T. G. Ludwig,* B.D.S., M.S., and B.G. Bibby, B.D.S., Ph. D., D.M.D.

Of the various attempts which have been made to establish the relative caries-producing capacities of different foods, only two [1,2] have been applied to any considerable numbers of foodstuffs. One of these [1] with which we are concerned at this time, postulated that the caries-producing potential of a food could be determined by multiplying the quantity of the food retained upon the teeth after ingestion by the amount of acid produced on fermentation of the food in saliva. From this study, a tentative grading of 100 common foods was offered. However, since the ratings made in these tests were based upon the results obtained from only one or two subjects, it was stressed that confirmatory studies were needed. Subsequently, 50 foodstuffs were tested in 4 or 5 subjects. Although the figures obtained were different, the foods retained essentially the same positions in the scale of caries-producing potentials. Incidentally, when similar foods were tested by Lundqvist [3] using a different procedure, they also fell in much the same order.

As a possible contribution toward increasing the reliability of laboratory determinations of decalcification potentials, this paper considers several variables which may influence the results and attempts to draw conclusions from a detailed study of a few representative foods.

A. Acid Production From Different Foods

In our previous studies [1,3] the measurements of acid production were made with saliva collected on different days from a single subject. Therefore, day-to-day variations in the acid-producing capacity of saliva, which subsequent tests showed to be quite considerable, may have influenced the findings. To reduce this factor to a minimum, the acid production from the foods used in the present study were all made at one time in aliquots of saliva taken from a single saliva pool. Paraffin stimulation was used to collect the saliva from several individuals, after which it was pooled and refrigerated until required. In determining acid production, a 3 gram portion of the test food was emulsified in 100 ml. of distilled water and from this mixture two 5 ml. samples were taken and placed into sterile test tubes. Five milliliters of pooled saliva were then added to each sample. One of these was immediately titrated with N/10 sodium hydroxide. A Beckman potentiometer was used to determine the end point of pH 8.5 which was selected for this titration. The other sample was incubated at 37° C. for four hours, after which it was titrated in the same way. The difference between the first and second titration represented the acid formed by salivary fermentation. To obtain a mean value of each food, the test was repeated 3 times on different days, using different salivary pools.

The quantities of acid produced from the test foods when incubated in saliva and other findings which will be referred to later are listed in Tables I and II. The greatest quantity of acid was formed from milk chocolate. Successively, smaller quantities were formed from such dissimilar foods as toffees, white

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bread, dates, and ice cream. The acid production values for beverages were low, much below that for the solution of toffees, which might have been expected to give similar figures. The amount of acid formed from a particular food did not seem to depend solely upon the percentage carbohydrate content of the food, since more acid was formed from milk chocolate (50 per cent carbohydrate) than from toffees (90 per cent carbohydrate) or fig sandwich (70 per cent carbohydrate).

TABLE I.—*Acid production and food retention for some solid carbohydrate foods*

Food	Total CHO (percent)	CHO retained (mg)	Food retained (mg)	4 hr. acid formation (ml 0.1 n)
Fig sandwich cookie	70. 0	560	800	1. 2
Date	77. 5	393	507	1. 6
Milk chocolate	50. 0	185	370	2. 1
Ice cream	17. 0	72	424	1. 6
Shortbread cookie	59. 5	220	370	1. 3
Toffee	90. 0	250	277	1. 8
Salted cracker	70. 0	240	343	1. 2
Oil sprayed cracker	71. 0	220	310	1. 2
Chocolate pudding	35. 0	105	300	1. 3
White bread	49 0	92	188	1. 8
Apple	17. 5	40	229	1. 0
Carrot (fresh)	9. 5	7	74	1. 2

TABLE II.—*Acid production and food retention for some beverages*

Beverage	Total CHO (percent)	CHO retained (mg)	Food retained (mg)	4 hr. acid formation (ml 0.1 n)
Pineapple juice (canned)	13 0	39	300	1. 2
Orange soda (uncarbonated)	10 0	24	240	1. 2
Cola (uncarbonated)	11 0	34	248	1. 1
Orange juice (canned)	11. 5	27	235	1. 0
Cola (carbonated)	10. 5	25	238	1 0
Orange soda (carbonated)	10 5	23	219	1. 0
Orange juice (fresh)	8 5	15	176	1. 2
Grape soda (carbonated)	11. 0	23	209	1 0

B VARIATIONS IN FOOD RETENTION FROM TIME TO TIME

The possibility that there could be time-to-time variations in food retention in the mouths of test subjects has an obvious bearing on the establishing values for any food.

To determine the extent of such variations, tests were made by having subjects ingest similar portions of the same food twice daily on 5 different days during a period of three weeks and measuring the quantity of food retained in each instance. Two commercial beverages and a doughnut were used for this purpose.

In determining the quantity of food retained in the mouth after eating, essentially the same methods as those described by Bibby, Goldberg, and Chen [3] were used except that the carbohydrate determinations were made by the anthrone method described by Morse[4] and by Morris.[5]

References at end of article.

TABLE III.—*Day-to-day variations in food retention in one individual*

Food and time	Food retained (mg.)				
	Day 1	Day 2	Day 3	Day 4	Day 5
Doughnut:					
10:30 a.m.	450	480	565	516	600
11:30 a.m.	475	492	500	575	565
Cola beverage:					
10:30 a.m.	310	228	255	300	295
11:30 a.m.	315	276	285	275	283
Orange soda:					
10:30 a.m.	251	277	210	360	255
11:30 a.m.	319	245	245	360	228

Table III shows the variation occurring from time to time in food retention for one individual.

It was found that in estimations made at different times during the same day, results were usually of the same order. However, more widely spaced estimations, for example those made at weekly intervals, were subject to much greater variation. The reasons for this greater variation are not known. However, factors such as variations in the composition of different batches of a particular food, in the test subjects' eating habits, and in the rate of flow of his saliva may be responsible. The retention values obtained over a three-week period for doughnuts (Table III) ranged from 450 to 600 mg. and for a carbonated beverage, from 210 to 360 mg. These variations are of a high order and suggest the need of caution in interpreting results of food retention measurements.

Later studies show that the extent of the variations could be reduced by increasing the amount of the test food eaten so that complete "saturation" of the mouth with the food would be insured, by adhering to a rigid time schedule for clearance procedures, and by using test subjects well acquainted with the difficulties in the experimental procedures.

C. Variations in Food Retention From Subject to Subject

Unless foods fall in relatively the same order when tested in different mouths, the use of retention figures would have little value in assessing the caries-producing potentialities of food.

Using the same techniques as above, repeated retention tests were made on 5 subjects, using 10 different foods to determine the nature of the variations in retention between different individuals. In these tests it was found that for any particular food some subjects gave retention values of a considerably higher order than did others (Table IV). However, the individuals who gave high values for one food gave relatively high values for all of the foods and, similarly, the subject who gave low values for one food gave relatively low values throughout. Milk chocolate, cookies, and ice cream gave the highest values for most of the subjects, while the lowest values were given by white bread, bananas, apples, and beverages.

TABLE IV.—*Variations in food retention in different subjects*

Food	Subject (mg.)				
	A	B	C	D	E
Ice cream	426	504	308	196	32
Milk chocolate	271	429	353	177	71
Shortbread cookie	223	332	433	240	59
Chocolate pudding	188	403	368	216	69
White bread	186	188	127	155	38
Oil sprayed cracker	123	237	117	218	25
Salted cracker	120	213	203	79	22
Banana	85	160	184	169	38

References at end of article.

The comparison of foods in different subjects demonstrated that differences in retention between individuals are large. It also offered somewhat doubtful support for our earlier impression that foods giving a high retention value for one person would be retained in large quantities by the others. Whether there are patterns of variability between individuals in the retention of different foods has yet to be established.

D. Retention in Different Areas of Mouth

The extent to which foods taken into the mouth are retained on the teeth or elsewhere has not been determined. To test this, acrylic appliances were constructed for a test subject to cover the teeth and to afford a tight seal at the gingival margins. Test foods were eaten in the usual way, but on the completion of eating, instead of rinsing the mouth in the normal manner, the acrylic appliances were placed over the teeth so that the food adhering to the teeth would be held in place. The mouth was then thoroughly rinsed with distilled water. These rinsings were collected and contained the food which had been retained upon the oral mucous membranes. Thereafter, the acrylic appliances were removed from the teeth, which were cleaned by use of an atomizer spray, and the mouth was rinsed again with distilled water. These rinsings were collected and pooled and to them were added the washings from the inside of the acrylic appliance. This total sample represented food which had been retained on the surfaces of the teeth. Carbohydrate determination on these two samples made it possible to calculate separately the amounts of the different foods held on the mucous membranes and on the teeth.

It was found (Table V) that some foods were retained in approximately equal proportions upon the teeth and on the mucous membranes; while for others a much higher proportion of the retained food adhered to the mucous membranes than to the teeth. In the former class were shortbread, cookies, dates, and milk chocolate. In the latter class were white bread, ice cream, apples, and sweetened beverage, although the difference was much more pronounced for apples and beverages than for the other two foods.

Table V.—*Areas of retention in the mouth for different carbohydrate foods*

Food	Total CHO (percent)	Retention on mucous membrane (mg.)		Retention in teeth (mg.)	
		CHO	Food	CHO	Food
Shortbread cookie	65.0	250.0	385	200.0	308.0
Date	77.6	250.0	322	200.0	258.0
Milk chocolate	50.0	160.0	320	150.0	300.0
Ice cream	20.0	60.0	300	30.0	150.0
Apple	20.0	50.0	250	2.5	12.5
White bread	59.0	62.5	125	40.0	80.0
Cola beverage	10.0	20.0	200	4.5	45.0

Since a food which adheres to the tooth surface is almost certainly more likely to participate in fermentation and acid production in the dental plaque than those persisting on the mucous membranes, the site of retention for a particular food represents a factor which should be considered in assessing its caries-producing properties.

E. Retention of Liquid and Solid Foods

The extremely low "decalcification potentials" given by sweetened beverages in our earlier study[1] suggested the desirability of confirming these findings and comparing them with some representative solid foods. For this purpose the retention of 12 solid carbohydrate and 8 sweetened beverages was determined by the usual method. The figures obtained are shown in Tables I and II. Additional com-

References at end of article.

parisons can be found in Table III. As a whole, the retention figures for the solid foods are higher than those for the liquids. This is particularly obvious if the comparison is limited to the retention of the carbohydrate content of the food rather than the retention of the whole food. If this is done, all the solid foods, with the exception of carrot, give higher carbohydrate retention than the beverages

Discussion

It would would appear at this stage that the assessment of the caries-producing capacities of foodstuffs by the methods of Bibby, Goldberg, and Chen [1] are subject to several limitations. The greatest difficulties met in making measurements of this type are in the accurate determination of food retention in the mouth. Not only are the analytical procedures involved subject to relatively wide sources of error, but variations in the retention of any one food occur from time to time in the same individuals. Although we have to some extent been able to substantiate the caries-producing ratings of different foods made by Bibby, Goldberg, and Chen, we feel that the significance of those findings should be re-evaluated. The use of a carbohydrate retention value rather than total food retention would seem to be indicated for calculations of decalcification potentials of certain, if not all, foods. If this is not done, calculations for foods, such as beverages with a low carbohydrate content, are unduly elevated by including as base for calculation the 90 per cent water content, whereas results for foods, such as toffee, are influenced only to the extent of the 10 per cent of other substances contained.

In addition, the fact that certain foods appear to be retained in much greater proportions upon the teeth themselves while others are retained chiefly upon the oral mucous membranes may considerably affect the amount of acid production from these foods on the tooth surface. The methods previously used do not seem well suited to permit assessment of this factor.

In addition to the difficulties associated with the measurement of food retention, the significance of the values obtained for acid production of the foods in salivary samples must be questioned. Apart from questions which might be raised as to methods in determining acid formation, it is doubtful whether the values obtained truly reflect the fermentability of the foods in the mouth. The effects produced by possible inhibiting [6] or stimulating [7] substances contained in the foods may differ considerably between the mouth and salivary samples in test tubes; and it is almost certain that the difference in environmental conditions [8] between the mouth and test tube will affect the rate and type of acid production from these foods. Moreover, it has been suggested [9] that the penetration into the dental plaque of the various carbohydrates contained in different foods may vary so that some will be more readily available for fermentation than others, and it is obvious that the significance of this factor cannot be assessed by in vitro measurement. These considerations may be even more pertinent in relation to the effects of foods on the progress of caries in existing cavities.

These conclusions suggest the desirability of attempting to assess the cariogenic capacities of different foods by measuring the degree and duration of acid production in dental plaques or cavities after eating. Preliminary studies will have been undertaken in these areas and will be reported subsequently.

Summary

Using 20 representative solid and liquid carbohydrate foods, a study was made of some of the variables which must be considered when laboratory comparisons are made of the caries-producing potentials of foods. It was found that considerable variations in food retention occur between different subjects and from time to time in the mouth of the same subject, that for some foods retention on the mucous membranes exceeds that occurring on the teeth, and that the carbohydrate of liquid foods is retained in the mouth in smaller quantities than that of solid foods.

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CARBOHYDRATE CONSUMPTION AND DENTAL CARIES*

By R. L. Hartles

Dental caries is one of the scourges of man which appears to be exacerbated rather than ameliorated by general improvements in living standards.

The onset of caries is a phenomenon of the tooth surface and is initiated by the secretion of the metabolic products of microorganisms in the dental plaque which adheres to enamel surface, particularly in those areas which are least self cleansing. There is much evidence to show that the dental plaque can produce organic acids from the metabolism of fermentable carbohydrates and that it is these acids which by lowering the pH locally cause the initial breach in the highly mineralized enamel. Dental caries is thus primarily of environmental origin; however, its onset and rate of progression may be influenced to a considerable degree by the chemical and physical structure of the enamel surface.

It is not easy to obtain direct experimental evidence in man concerning factors which predispose to dental caries. The disease is predominantly one of young people and it is not really admissible to attempt deliberately to increase caries incidence by dietary means. There is, however, considerable indirect or circumstantial evidence to implicate carbohydrate consumption in the production of caries.

Relation Between Dietary Changes Arising From War Time Restrictions and the Incidence of Dental Caries

There was in many European countries from 1939 to 1945 a reduction in the consumption of sugar, highly refined carbohydrate, sweets, and manufactured confectionery; less meat was also consumed. On the other hand the consumption of potatoes and vegetables increased, more liquid milk was consumed, and the flour was of a high extraction rate. The major change in carbohydrate consumption was in quality rather than in quantity.

The interesting fact emerged that these enforced dietary changes were associated with a progressive decrease in the occurrence of caries in the 5-year age group of children in the United Kingdom. The lessening of caries continued until 1947–1948 when the incidence began to rise (Mellanby and Mellanby (1–3)). Similar findings were reported from Scandinavia (Toverud (4)) and Japan (Takeuchi (5)).

Mellanby and Commoulus (6) suggested that the reduction of caries incidence was due to an increased intake of protective foods and vitamins. This opinion, however, is not supported by observations in Finland, where despite much privation and very poor nutritional conditions there was a similar reduction in caries (Wilska (7)). The most likely reason for the decrease in caries incidence during the 1939–1945 war was the obligatory reduction in the consumption of easily fermentable carbohydrate and especially in the amount available for eating between meals. With the gradual relaxation of restrictions the caries incidence began to rise in 1947–1948.

Other indirect evidence associating dietary factors with caries experience has come from the study of primitive peoples. Pederson (8) showed that caries in the Eskimo increased when they adopted a civilized diet, the major change being an increased sugar consumption. In Ghana, McGregor (9) found less dental caries in rural than urban areas, which he attributed to nonavailability of manufactured sugary confections. Although in all these cases there may be

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other factors involved apart from increased sugar consumption, sucrose emerges suspect as the prime cariogenic dietary factor.

In studies carried out on institutional children many observers have been impressed with their low caries experience. This has been attributed to the low intake of sugar, uniform and regular dietary habits, and the virtual absence of between-meal eating (Breese (10), Koehne and Bunting (11), and Stones et al. (12)).

Important direct evidence concerning the effect of carbohydrate intake on caries was provided by the results of an investigation on institutional patients at Vipeholm in Sweden (Gustafsson et al. (13)). The principal findings were that an increased consumption of sugar could produce a significant increase in caries, but the effect depended on the manner of administration of the sugar. When extra sugar was consumed in solution little or no increase in caries was observed. The greatest increase in caries occurred in those subjects who consumed sugary confections between meals; in this respect caramels and toffees were more cariogenic than milk chocolate. Thus perhaps the most important finding of this study was the associating of between-meal consumption of sugar with an increase in caries. In this respect it is of interest that King et al. (14) were unable to demonstrate any increase in caries in children who were fed extra sugar at meal times.

It is possible to draw certain tentative conclusions from population studies. (*1*) Caries incidence tends to be greater in populations with a high consumption of sugar. (2) It is the quality rather than the quantity of carbohydrate consumed which is important in the causation of caries. (*3*) Frequent eating of sugary confections between meals increases caries experience.

In order to investigate the relative cariogenicity of different carbohydrates in a controlled manner it is necessary to study caries in experimental animals maintained on defined diets.

Experimental Caries in Animals

Caries has been produced experimentally in the monkey, rat, cotton rat, and hamster by the feeding of diets containing a high proportion of sucrose (Sognnaes (15)). The monkey dentition is similar to that in man, but in experiments requiring large numbers of animals i' : use is precluded for most workers by factors of cost, husbandry, and time. ich of the work on experimental caries has been carried out therefore on caries-susceptible strains of rat, cotton rat, and hamster.

Evidence is accruing to show that there are significant differences between the cariogenicity of different carbohydrates. Shafer (16) showed that in the hamster a raw starch diet produced little or no caries, a diet containing sucrose was highly cariogenic, and a glucose diet produced an intermediate caries score. Gustafson et al. (17) found, again in the hamster, that diets containing sucrose were more cariogenic than diets containing equivalent amounts of glucose, lactose, or maltose.

Many workers have demonstrated that caries can be induced in certain strains of rat when they are maintained on diets containing about two-thirds by weight of sucrose (Sognnaes (15)). Caries in the rat is reduced to a very low level when sucrose is replaced by raw potato starch (Hartles and Lawton (18)) or by raw wheat starch (Grenby (19)).

When carrying out studies of caries in the rat it has been observed that there is a significant variation in caries production between litters, while there is very little variation within litters. It is important therefore that experimental blocks be constructed from siblings so that all comparisons are made within litters (Marthaler et al. (20)).

Recently Green and Hartles (21), using the sectioning technique of König et al. (22) for the assessment of early caries, have shown that uncooked maize starch diets are relatively noncariogenic in the rat compared with sucrose diets. Diets in which the carbohydrate (67%) was replaced by finely ground biscuit were more cariogenic than the uncooked starch, but less cariogenic than the sucrose diets (Table I).

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The significance levels for these differences are shown in Table II.

One of the biscuits, Thin Wine, contained 9)% sugars of which 4.6% was sucrose and 5.3% reducing sugar; the other, Morning Coffee, was slightly sweeter containing 22.3% sugars of which 20.5% was sucrose and 1.8% reducing sugar. The total carbohydrate in both biscuits was about 75%. There is a suggestion that the Morning Coffee biscuit with its higher sucrose content is more cariogenic than the Thin Wine biscuit but the difference does not reach significance at the 5% level.

TABLE I.—*Caries experience of rats maintained on different high-carbohydrate diets*[1]

Dietary carbohydrate:	Number of carious lesions per rat
Sucrose	5.78
Maize starch	.71
Thin wine biscuit	3.00
Morning coffee biscuit	4.14

[1] Data from Green and Hartles (21).

TABLE II.—*Significance levels for comparison of effects of dietary treatments*

Dietary treatment:	Level of significance
Sucrose versus all other treatments	$P<0.001$
Starch versus biscuits	$P<0.001$
Starch versus all other treatments	$P<0.001$
Sucrose versus biscuits	$P<0.01$
Morning coffee versus thin wine biscuits	$P>0.05$

The fact that the biscuit diets were less cariogenic than the sucrose diet but more cariogenic than the starch diet is interesting. The biscuit diets were more cariogenic than might have been expected from their comparatively low sugar content and it is possible that the manufacturing processes have modified the composition and consistency so as to influence the cariogenicity of the biscuits. There appears to be little information from animal studies concerning the critical level of sucrose in starch-sucrose mixtures or of interactions between the two. Schweigert et al. (23) found that in the cotton rat, replacement of half the dietary sucrose with dextrin did not lessen the severity of tooth decay; replacement of 75% of the sucrose with dextrin, however, caused some reduction in caries. Recently Grenby (24) has shown that the cariogenicity of diets containing 67% dried, pulverized bread was significantly increased when 10% of the bread was replaced by sucrose.

In an attempt to find out a little more about the relative cariogenicity of different carbohydrates we have carried out a study in the rat of the effects on dental caries of uncooked and roll-dried maize starch alone and mixed in equal quantity with sucrose. The total carbohydrate in the diet was 72%. Some quite interesting results were obtained: rats receiving the sucrose diet had significantly more caries than all other groups; rats on the uncooked starch diet had significantly less caries than all other groups. Roll-dried starch produced more caries than uncooked starch, and rather surprisingly, the mixture of uncooked starch and sucrose was more cariogenic than the mixture of roll-dried starch and sucrose (Table III).

References at end of article.

TABLE III.—*Variation in caries experience with different dietary carbohydrates*

Dietary carbohydrate	Number of carious lesions per rat	
	Total	Advanced
72 percent sucrose	7.5	3.0
72 percent uncooked maize starch	.9	0
72 percent roll-dried maize starch	3.1	.6
36 percent sucrose	7.4	2.6
36 percent uncooked starch		
36 percent sucrose	6.0	1.8
36 percent roll-dried starch		

It is known that in the presence of saliva the oral flora can metabolize many sugars, oligosaccharides, and even polysaccharides (Hartles and Wasdell (25)) to acidic products. There is, however, an increasing body of evidence from both human and animal studies to indicate that sucrose is the most potent cariogenic carbohydrate.

One very interesting lead has opened recently. There is a growing awareness that sugars are not only catabolized by the organisms of the dental plaque, they may act in varying degrees as substrates for the synthesis of glycosans. Gibbons and Socransky (26) found that the plaque microflora from subjects with high caries activity produced more iodophilic polysaccharide than plaque obtained from individuals with low caries activity. They suggest that such polysaccharides can be formed from environmental carbohydrates and utilized as a reserve energy source and so continue to form acids in the absence of environmental carbohydrate. Work has continued in the study of the kinds of microorganism which can synthesize polysaccharide (Berman and Gibbons 27); one strain of cariogenic streptococcus (i.e., produces caries in germ-free animals) has been found to produce vastly more capsular polysaccharide from sucrose than from glucose (Gibbons et al. (28)).

Recently, Leach (29) and Critchley et al. (30) have shown that the extracellular polymeric carbohydrate in dental plaque is not, as was hitherto believed, derived from salivary glycoprotein but is a mixture of dextran and levan, the production of which demands the presence of sucrose.

The oral flora, whether aggregated in the plaque or dispersed in the saliva, must survive for varying periods of time when the detritus from the host's diet has disappeared. It is highly probable that the ease of survival depends in part on the ability of the plaque microflora to synthesize reserves of polysaccharides in times of abundance for use in times of scarcity. It is in such circumstances that a low plaque pH may be maintained for a longer period of time thus leading to a cariogenic situation.

Thus it is not only the catabolic activity of dental plaque which is important; the anabolic metabolism of both intra- and extra-cellular polysaccharides may also prove to be a governing factor in the causation of dental caries.

In this respect two prerequisites are necessary: (*1*) the presence in plaque of microorganisms capable of synthesizing polysaccharide and (*2*) the presence of suitable substrates.

There is a strong case for considering that sucrose is the substrate most readily converted by the dental plaque into polysaccharide.

A possible explanation of our observation that a diet containing sucrose and uncooked starch was more cariogenic in the rat than a diet of sucrose and roll-dried starch, is that in the former sucrose is the only rapidly metabolizable substrate, whereas in the latter diet other substrates are available to compete with the sucrose, consequently less synthetic activity occurs.

Thus the interesting tentative hypothesis emerges that the indictment of sucrose as the most potent cariogenic foodstuff is related not only to the ease of its fermentation to acids but also to its ability to act as a substrate for levan and dextran formation within the dental plaque.

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Much more work remains to be done to substantiate (or refute) this view of the cariogenic potential of sucrose but an interesting lead has been opened which is worthy of further exploration.

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DENTAL CARIES: PROSPECTS FOR PREVENTION

Combined Utilization of Available and Imminent Measures Should Largely Prevent This Ubiquitous Disease

By Henry W. Scherp *

Dental caries is localized, progressive decay of the teeth, initiated by demineralization of the outer surface of the tooth due to organic acids produced locally by bacteria that ferment deposits of dietary carbohydrates. With progressive loss of tooth mineral and secondary destruction of tooth protein by continued bacterial action, cavities form which, if untreated, extend and destroy most of the tooth, often leading to serious infection of the surrounding tissues. Almost everyone in the United States experiences dental caries to some degree, mostly before adulthood. This disease is the leading cause of lost teeth before age 35, when chronic progressive destructive periodontitis (pyorrhea) begins to supervene. Though not ordinarily considered to be endangering to life, these two diseases are among the most prevalent and troublesome afflictions of man. Both are consequences of selective colonization of tooth surfaces by bacteria indigenous to the oral cavity.

During the past decade, dental caries research has experienced an impressive resurgence on a broad front, catalyzed primarily by experimental substantiation of the concept that caries results from one or more transmissible infections.

Specifically, caries results from colonization of vulnerable surfaces of the teeth by a characteristic group of bacteria, harbored by many members of a susceptible host species and transmitted from them to previously uninfected members of the same species. These bacteria ferment dietary carbohydrates in situ, principally to lactic acid which, at susceptible sites, initiates the carious lesion by demineralizing the enamel surface. In particular, the predominant group of cariogenic bacteria identified until now can metabolize sucrose in a peculiar way, producing extracellularly an adhesive polysaccharide (dextran) from the glucose moiety, and mainly lactic acid from the fructose moiety. Typically, these bacteria also store intracellular polysaccharide (amylopectin) during periods of environmental carbohydrate abundance and utilize it with the formulation of lactic acid during periods of environmental carbohydrate deficiency. The development of caries requires critical relationships between tooth surface, oral microbiota, and dietary carbohydrate. The logical approach to control, therefore, is to modify one or more of the three factors in this host-parasite-environment complex.

Yet despite the advances in our understanding of its pathogenesis, caries continues to be a major public health problem. In the United States, nearly everyone sooner or later develops some caries; it has been estimated that we now spend about $2 billion annually to repair the resultant damage. Even so, we obviously meet only a minor fraction of the need. Since caries is principally a disease of young people, recent experience of the U.S. Army gives a representative picture of the problem. Army surveys indicate that every 100 inductees require 600 fillings, 112 extractions, 40 bridges, 21 crowns, 18 partial dentures, and one full denture. To repair completely the damage caused by caries nationwide would cost an estimated $8 billion more annually than we now spend.

On the other hand, review of the caries research accomplished warrants expectation that we could greatly speed amelioration of such deplorable statistics by a concerted effort to apply existing knowledge, to develop established leads,

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and to foster the fundamental research judged most likely to produce utilizable new information. To this end the National Institute of Dental Research has embarked on a National Caries Program.

For control of caries, priority must be given to prevention, rather than repair or cure, because there are no clearly evident therapeutic leads that promise to do more at best than arrest a carious lesion once it is clinically detectable. On the other hand, experience cautions us that prevention will be achieved only gradually. Meanwhile, heavy demand for restorative dentistry will continue and so will the research for improved restorative materials and procedures. This discussion, however, is limited to prevention.

In seeking areas where action seems most likely to benefit the most people promptly, three questions were asked. What measures of proved efficacy are being used inadequately? What measures have been sufficiently proved by preliminary clinical trials to warrant large-scale field demonstration or national application? What fundamental research is ready for intensive development and clinical trial? The currently most likely answers follow, as they pertain respectively to tooth, diet, and cariogenic bacteria.

PROTECTING THE TEETH

Adequate incorporation of fluoride in teeth, particularly in the outer layers of the enamel, remains the one thoroughly proved means to increase resistance of teeth to caries. The experience of 25 years leaves no doubt that daily intake throughout life of about 1 milligram of fluoride per person, as commonly provided by from 0.7 to 1.2 parts of fluoride per million parts of water in public water supplies, harmlessly lowers the caries rate by from 50 to 60 percent in permanent teeth and slightly less in deciduous teeth, under present conditions in the United States. Logically, a national program to prevent caries should be based on universal fluoridation at this level. Yet in 1967 only 52.8 percent of our population using public water supplies received this benefit, 46.3 percent by controlled artificial fluoridation and 6.5 percent by natural fluoridation. Twenty-two percent of the total U.S. population, or 44 million persons, do not have access to public water systems, though presumably many ingest naturally fluoridated water and some receive controlled amounts of fluoride by other means. Clearly a major effort is still needed, to fluoridate more communal water supplies and by alternate means to get fluoride to the large fraction of our population not thus accessible. The latter group could be reached by controlled fluoridation of water supplies at central schools in rural areas; via the diet, as by addition of fluoride to salt, sugar, flour, milk, or other widely consumed foodstuffs; by direct ingestion of fluoride tablets or solutions; or by do-it-yourself topical application of fluoride, whether in dentifrices or in aqueous solutions. Essentially, this seems to be a problem of public health administration.

What about the enormous number of carious lesions that develop despite fluoridation? Are we recommending a sufficient dosage of fluoride? The thorough epidemiological studies of the past indicated that more than .1 ppm of fluoride in the water supply did not confer much additional protection against caries in permanent teeth. Some investigators, however, have recommended 2 ppm as more beneficial for deciduous teeth, though at some risk of slight fluorosis (mottled enamel) in permanent teeth. Alternatively, the fluoride content of enamel can be increased by direct (topical) application, with practically no risk of fluorosis. Recent studies indicate that intensive topical application of fluoride, to increase the fluoride content of the outer few microns of enamel to two or three times the average level acquired from fluoridated water, can reduce caries by as much as 75 to 80 percent—that is, half again as much reduction as is brought about by controlled fluoridation of water supplies. Furthermore, the anticaries effect and the elevated fluoride content of the enamel persisted for at least 23 months without additional topical application and without fluoridated water. By using a slightly acid-phosphate-fluoride solution and prior treatment of the teeth with cations such as aluminum or titanium, which complex strongly with fluoride ion, it should be possible to reduce greatly the number of applications needed to achieve the desired levels of enamel fluoride.

Caries that develops despite optimum fluoridation of teeth occurs principally in the pits and fissures that are a normal feature of the occlusal (grinding) surfaces of the molars and bicuspids. This vulnerability is usually attributed to

impaction of food residues and bacteria plus thinness of the enamel in these areas, at least in newly erupted teeth; with age, the enamel thickens and the susceptibility to caries lessens. On the other hand, it was shown in the 1920's that areas with pits and fissures could be protected against caries either by drilling them out to form wide nonretentive grooves or by preparing them like cavities and then filling them with dental amalgam. No matter how effective, these procedures obviously were not destined to gain wide popularity. Now the same result can be accomplished by sealing the occlusal surfaces with a newly developed adhesive polymer. The surface is cleansed, conditioned for bonding by a brief etch with a solution of phosphoric acid and zinc oxide, washed, and dried. The monomeric adhesive solution is painted on with a fine brush and allowed to flow out briefly to form a smooth coat. Polymerization is initiated by a short exposure to ultraviolet light of wavelength 3660 angstroms, which is shorter than the visible but longer than the "sunburn" range. One year after a single application, this sealant was retained in 99.5 percent of treated sites, which remained free of caries, whereas 42 percent of untreated contralateral sites in the same mouths had become carious. After a second year, sealant could not be discerned in 13 percent of treated sites on permanent teeth or in 50 percent on deciduous teeth; nevertheless, respective caries reductions of 99 percent and 87 percent were found. This simple, rapid, painless procedure can be carried out entirely by properly instructed and supervised dental assistants. Optimally, occlusal surfaces should be sealed soon after eruption of the tooth to protect them during their most caries-susceptible period—the first several years at least. It will be important to ascertain whether such early sealing impedes the previously mentioned normal maturation and development of resistance to caries, thereby possibly leaving the pits and fissures indefinitely susceptible to caries, if uncovered. Even if so, routine inspection and reapplication of sealant, if necessary, could compensate for this limitation. Application of this measure on a public health scale would, of course, have to overcome an enormous manpower problem, quite likely necessitating a great increase in auxiliary dental personnel.

MODIFYING THE DIET

An abundance of epidemiological and experimental evidence indicates that sucrose is a particularly cariogenic culprit in our modern diet. So far as we know this unfortunate property relates to the peculiar way in which sucrose can be metabolized by cariogenic streptococci, as mentioned previously; admittedly, much more investigation of this point is needed. Whatever the mechanism, if we got practically all of our carbohydrate from starchy foods, and if we were adequately fluoridated, caries on the crowns of the teeth would almost certainly be negligible. Such is the case in regions of Southeast Asia, for example. Though the number of subjects is necessarily small, data on persons suffering from hereditary fructose intolerance point to the same conclusion. These persons are deficient in the liver aldolase that splits fructose-1-phosphate, an essential step in human fructose metabolism. They become violently ill if they ingest more than very small amounts of sucrose or fruit containing fructose. Consequently they tend to avoid sweetstuffs of all kinds, and combine starchy foods instead. They experience little or no caries.

Nevertheless, a low sucrose diet does not necessarily guarantee freedom from caries. Teeth in skulls from presucrose cultures exhibit a significant prevalence of caries. Though the attack rate in the original population can only be conjectured, it seems to have been much lower than in modern times. On the other hand, some geographically isolated populations currently subsisting predominantly on locally grown starchy diets, and presumably consuming little or no sucrose, experience a caries prevalence as great as half that recorded in unfluoridated regions of the United States. Since nearby groups on similar diets experience little or no caries, environmental factors presumably are involved—possibly a peculiarly high level of fluoride and other trace elements in the diet.

Whether replacement of dietary sucrose by other sugars would reduce human caries as effectively as replacement by starch has not been ascertained: there are no data. In experimental caries of hamsters and rats, however, glucose or fructose, or an equimolar mixture of the two, have on the whole induced much less caries than sucrose. Comparisons between these studies are very difficult because of differences in strains of animal, consistency and composition of diets, methods of scoring caries, and measures to ensure presence of cariogenic

bacteria. The reductions in caries activity have been most pronounced on smooth surfaces of teeth, where development of caries seems to depend on *Streptococcus mutans* and its adhesion by extracellular dextran produced from sucrose. In the hamster, all caries is of this type because of the morphology of the teeth. In the deep fissures of the rat molars, on the other hand, food impaction makes adhesion unnecessary and indigenous acidogens, as well as *S. mutans*, can initiate caries if provided with various fermentable sugars, such as glucose, fructose, maltose, or sucrose. Substitution of starch for sugars, however, consistently reduces the caries scores to very low levels.

Replacement of sucrose in our diet would require quite a cultural and technological revolution, but might not be as impractical as it seems. Trials with candies made with a hydrogenated starch hydrolyzate have been made in Sweden. Even if sucrose could be replaced by other sweets in candy or other between-meal snacks alone, the result might be quite beneficial, judging by animal studies and epidemiological data. Merely reducing the frequency of eating a high-sucrose diet significantly reduces caries in rats. In humans, increased frequency of between-meal eating of sugary snacks correlates with increased caries attack. Furthermore, in vitro at concentrations of sucrose below 0.5 percent, *Streptococcus mutans* makes little or no dextran. This fact emphasizes the importance of keeping as low as possible the intraoral accumulation of sucrose, whether by reducing the frequency of intake, avoiding adherent sweetstuffs, or diluting the sucrose in sweetstuffs with other sweeteners. The considerations in this paragraph are, of course, predicated on the as yet untested assumption that in human diets other sugars would be less cariogenic than sucrose.

If it is not practicable to replace sucrose in our diet, can anything be added to the diet to mitigate its cariogenicity? Phosphates are a possible answer. More than 150 laboratory studies agree that addition of any of a wide variety of inorganic and organic phosphates to high-sucrose and other cariogenic diets significantly reduces caries in rats and hamsters, in some experiments almost completely. On average, the phosphorus content of the diet must be doubled to get a marked caries reduction. So far, the cyclic condensed salt, sodium trimetaphosphate, has been the most effective one. How phosphates mitigate caries has not been ascertained, except that they act locally in the oral cavity and seem to benefit newly erupted teeth the most. Unfortunately, the relatively few clinical trials reported so far do not tell us unequivocally whether or not a phosphate dietary supplement reduces caries in humans. Translating the conditions of the animal model into a regimen suitable for delivering adequate extra phosphate to humans presents many complexities. Conceivably it might be helpful if a phosphate were incorporated in sweetened between-meal snacks alone. Also, since phosphates evidently prevent caries by local action in the oral cavity, frequent direct application of concentrated solutions to the teeth might be beneficial.

Thirty years ago, epidemiologists of the U.S. Public Health Service were struck by the wide variations in caries experience between different localities. These differences were greatest between low-fluoride areas, though they were discernible between high-fluoride areas also. It was suggested that caries resistance might be attributable not only to the fluoride content of drinking water but also to other trace elements or to unusually high concentrations of ordinary constituents of the water. Only recently, however, has this experiment of nature begun to receive the epidemiological and laboratory study that it merits. study indicates a correlation between low caries experience and increased concentrations of boron, lithium, molybdenum, strontium, titanium, and vanadium in the drinking water. Except for fluoride, however, available data indicate that from 80 to 99 percent of our trace element intake comes from foodstuffs. Consequently, attention to the mineral content of water alone might mislead us. Thus, another study emphasizes the "alkaline earth" factor in the soil—the content of strontium, calcium, barium, magnesium, lithium, and potassium and, to a lesser degree, zirconium and boron. Though it is clearly premature to consider controlled administration of such elements to humans, if these correlations can be validated and shown to signify a casual relation, an anticaries measure as potent as controlled fluoridation should eventuate.

COMBATING CARIOGENIC BACTERIA

A comprehensive program for preventing caries should logically include measures to reduce colonization of the teeth by cariogenic bacteria or to suppress

their activities, as by topical application of antibacterial agents, metabolic regulators to inhibit production of cariogenic products, or enzymes to digest products conducing to adhesion of bacteria to teeth, and immunological measures. Paradoxically, while strong emphasis has been given to increasing the resistance of teeth to caries and reducing the cariogenicity of the diet, proportionately little attention has been given to antimicrobial measures, possibly because until recently evidence was lacking for specific agents in caries.

The cariogenic importance of a group of anaerobic streptococci now designated as *Streptococcus mutans* has been well substantiated. *Streptococcus mutans* occurs indigenously in the human mouth in widely separated parts of the world and often constitutes the majority of streptococci in dental plaque. Its preferred habitat is the surfaces of teeth, whether natural or artificial: it is scarce in the mouth before teeth erupt and becomes practically undetectable by direct culture in the mouths of edentulous adults when they stop wearing their dentures.

Oral infection with *S. mutans* and a diet high in sucrose are important and probably essential components for caries in hamsters, and for smooth-surface caries in rats. Streptococcal strains closely resembling the cariogenic *S. mutans* indigenous to rats and hamsters have been isolated by direct culture regularly from human carious lesions, where they frequently constitute the majority of the streptococci. Such strains induce caries when implanted in the oral cavity in conjunction with a suitable diet in germfree and "relatively gnotobiotic" rats, and in hamsters, gerbils, mystromys, and monkeys. The evidence for etiologic significance of *S. mutans* in human caries is therefore comparable to Koch's (1882) classic evidence for the causative role of the tubercle bacillus in human tuberculosis. Strains of *S. mutans* labeled by acquired resistance to streptomycin have been implanted in the human oral cavity. The high endemicity of wild-type *S. mutans* in the test population, however, prevents conclusions about the cariogenicity of the implanted strain.

Some strains of several other bacterial species have induced coronal caries in hamsters, gnotobiotic rats, or "relatively gnotobiotic" rats, when implanted in the oral cavity in conjunction with a high-sucrose diet. Included are strains of *Streptococcus faecalis*, *Streptococcus sanguis*, *Streptococcus salivarius*, streptococci not identifiable as recognized species, *Lactobacillus acidophilus*, and *Lactobacillus casei*. On the whole, however, these organisms have induced caries less regularly and less extensively than strains of *Streptococcus mutans*, particularly on coronal smooth surfaces.

Lactobacilli, long the leading contender as the microbial factor in human caries, have understandably been eclipsed of late by the evidence favoring streptococci. I believe there is good reason to keep them in the running. In addition to the experiments just cited, showing that monoinfection with some pure cultures of lactobacilli can induce caries in rats, other investigations have demonstrated a preferential accumulation of lactobacilli, commonly in conjunction with streptococci, in dental plaque prodomal to caries and in carious lesions in humans and monkeys.

The greater cariogenicity of *S. mutans* seems to relate to its characteristic of producing from sucrose extracellular water-insoluble "dextrans" of high molecular weight. Such dextrans conduce to greater adhesiveness of *S. mutans* to the tooth surface. They adsorb strongly to plain and saliva-coated powdered hydroxyapatite and consequently to the tooth surface. Suspensions and glucose-grown (that is, dextran-free) cells of *S. mutans* are agglutinated specifically on addition of high-molecular-weight dextran; accordingly, such cells attach to dextran-coated teeth. *Streptococcus sanguis*, another ubiquitous dextran-forming indigene of the tooth surface, does not exhibit similar behavior; though its dextran is water-insoluble, one must assume that it lacks cellular receptor sites for dextran. Nevertheless, its dextran might contribute to plaque accumulation by trapping *S. mutans*. In contrast to *S. mutans*, however, the relative abundance of *S. sanguis* in dental plaque has not been correlated with smooth surface caries in children.

Dextran accounts for as much as 10 percent of the dry weight of plaque, or a third of plaque matrix. Long-continued apposition of suitably acidulated gels, such as agar, gelatin, or cellulose derivatives, to teeth in vitro produces lesions closely resembling natural early enamel caries. Thus, dextran gel in plaque, acidulated by bacterial fermentation, might help initiate natural caries.

A measure which decomposes dextran or impedes its synthesis should mitigate caries. Accordingly, incorporation of a dextranase preparation in the diet and drinking water, or in the water alone, dramatically reduces both plaque accumulation and caries in hamsters on a high-sucrose diet and harboring *S. mutans*. Similar experiments in rats give less impressive results, particularly in caries of the molar fissures, where presumably the production of dextran and adherence of plaque are not essential and mechanical retention of cariogenic diet and bacteria suffices to induce caries.

A dextranase mouthwash can eliminate the dextranous portion of human dental plaque, though the gross diminution of the accumulation is not noteworthy, probably because human dental plaque is only partially composed of *S. mutans* and its dextran. Whether dextranase can be used to reduce the caries increment in humans will be learned from controlled clinical trials in progress.

Continuing oral administration of antibacterial agents via food and water can suppress specific cariogenic bacteria in rats and hamsters and reduce their caries scores by 90 percent or more. Following withdrawal of the agent, a stock of animals may remain free of the specific organism and nearly free of caries through a number of successive generations. An irreducible low level of caries activity has always remained, presumably due to drug-resistant cariogenic bacteria that are normally present in the oral microbiota.

The most convincing comparable data for humans have come from patients receiving penicillin by mouth daily for rheumatic fever or for chronic respiratory diseases. During periods from 2 to 5 years, these patients developed 54 to 69 percent fewer carious tooth surfaces than a comparable, untreated group. The anticaries effect tended to persist after cessation of therapy.

Strangely, there has been a general reluctance to exploit the promising lead implicit in data of this kind, possibly because the microbial target was not well enough defined, possibly because of undue concern about deleterious changes in the oral microbiota, possibly because of unfavorable effects of certain antibiotics, such as tetracyclines, on the teeth. Now the target is more nearly defined, and bacteriological studies indicate that long-term administration of penicillin, for example, does not alter the oral flora harmfully. Surely a vigorous program to develop rational use of antimicrobial agents topically in oral hygiene is long overdue. Not only should such regimens help prevent caries but also they should help avert the onset and progress of chronic destructive periodontitis, the major cause of lost teeth during middle and later life.

Prospect of chemical control of plaque, however, should not be allowed to eclipse the continuing usefulness of mechanical oral hygienic measures, that is, the toothbrush and adjuvant means for interdental cleansing. Such cleansing can keep the bacterial population at the gingival margin low enough to avert chronic periodontitis. The old adage that a "clean tooth never decays," however, has not been proved conclusively. What appears to the unaided eye to be a clean tooth still harbors bacteria in fissures, minute surface faults, and organic tracts of the enamel.

Though antibiotics have received the more attention recently, some investigators maintain that antiseptics (synthetic antibacterial chemicals) have a theoretical advantage. Since their antimicrobial spectrum is generally not very specific, their use could be expected to hold the oral biota in check overall and thereby entail less risk of altering its normal balance deleteriously. On the other hand, at the higher concentrations that could be used topically, the specificity of many antibiotics broadens, so that they inhibit both gram-positive and gram-negative bacteria, for example.

Much evidence indicates that a partial or selective reduction of plaque-forming oral bacteria would go far to reduce caries. Analysis of a physical model for plaque action in the tooth-plaque-saliva system, based on experimental data, indicates that caries would be negligible if the cariogenic flora were only repressed and kept at a sufficiently low level. In these circumstances, vulnerability of sites on teeth and cariogenicity of diet would become minor concerns. Animal experiments suggest that it might be feasible to control the human oral flora adequately to prevent caries by infrequent but regular intraoral application of suitable antimicrobial agents. Favoring the success of this approach is the slow average multiplication of the plaque biota in situ, estimated to be of the order of two or three cell divisions a day, compared to about one every half hour under optimal conditions in vitro. In the mouth, these organisms theoretically

would require about half a day at least to recover from exposure to an inhibitory agent, and longer if the agent is one of those whose effects carry over through several generations.

Naturally one does not propose indiscriminate dosing. Antimicrobial agents for topical application to prevent caries should be carefully selected and used according to recognized criteria of safety and efficacy. A few tests in humans have demonstrated that plaque accumulation can be prevented, in some cases to the point of macroscopic indetectability, by agents meeting many of these criteria, but the field remains largely undeveloped.

Caries-conducive activities of plaque bacteria might be controlled selectively without resorting to a direct attack on their viability with antibiotics and antiseptics. Theoretically one could find metabolic regulators that would inhibit or divert, for example, bacterial utilization of cariogenic substrates such as sugars, production of acids, formation of adherent extracellular polysaccharides, and accumulation of intracellular polysaccharides as reserve nutrient. Alternatively, bacterial colonization of the teeth might be averted by chemically altering the enamel surface so that bacteria cannot adhere to it.

Finally, the cariogenic flora might be kept under control by active immunization, either with antigens of the bacterial cells proper or with antigenic bacterial products such as dextransucrase. Lively interest in a "caries vaccine" continues, despite the great paucity of data warranting anticipation of success. First of all, unlike the majority of infectious diseases, dental caries confers no resistance to a subsequent attack. Caries does not engender a characteristic serum antibody response, for example, to cariogenic streptococci. The antibody content of serum, however, does not indicate the level or type of antibody operative in the oral cavity.

Except for a minor contribution from plasma via exudate from gingival crevices, the predominant immunoglobulin in the human mouth comes from the salivary glands and belongs to the distinctive class known as secretory immunoglobulin A (IgA). Defensive functions of secretory immunoglobulins in general remain conjectural or unexplored, though considerable evidence indicates that they protect against viruses that invade the respiratory and intestinal tracts. Similarly, the occurrence in the gut of secretory immunoglobulins ("copro-antibodies") reactive with enteric bacteria suggests that they help protect this very heavily polluted region of the body.

Various antibacterial antibodies occur in whole saliva and pure parotid secretion, though their origin and immunoglobulin class have been identified in few cases. Natural exposure to the antigenic stimulus of an *a*-streptococcus in the oral cavity has been shown to engender specific antibody locally. A bactericidal effect of antibodies, however, depends on adjuvant reactions with components of complement or on phagocytosis by leukocytes, or on both; neither seems to function more than minimally in the lumen of the oral cavity. Besides, IgA does not activate or consume complement. Neutrophilic leukocytes enter the oral cavity continuously in considerable numbers after the teeth erupt, mostly via the gingival crevice. Oral neutrophils exhibit some degree of phagocytic activity in vivo, particularly in the gingival crevice and in the surface film of the oral mucosa. Immunofluorescent staining shows that some of the cocci and bacilli in saliva and dental plaque have adsorbed IgA in vivo. Some of the coated bacteria have been found in neutrophils, suggesting that they had been sensitized for phagocytosis. In general, however, neutrophils quickly degenerate in contact with saliva.

On the positive side, some people develop very little caries, and one or two persons per thousand remain free of caries indefinitely, seemingly despite exposure to cariogenic bacteria and diets. Such persons have often been designated as caries-immune. The basis of this natural freedom from caries has not been ascertained—whether it correlates with other parameters, whether it is innate or acquired, whether it depends on antibodies or nonspecific physiological factors, whether it can be developed by artificial means. Familial influences are indicated, for such caries-free persons are about 40 times as numerous among relatives as in the general population. Sex factors are indicated also, for caries-free male adults outnumber females by about two to one. Caries-free adults are considerably more numerous in regions where environmental fluoride is naturally high, but they are by no means absent in other regions. Saliva from caries-free subjects has been reported to contain a nonspecific heatlabile bacteriolytic fac-

ter active against lactobacilli and streptococci. Blood neutrophils from caries-free subjects tend to phagocytize cariogenic streptococci to a greater degree than blood neutrophils from caries-active subjects.

Though the probability of preventing caries by artificial immunization seems quite small, it must not be ignored on a priori grounds; after all, the essence of research is the accomplishment of the seemingly impossible. Continued fundamental investigation of immunity in the oral cavity should be encouraged. Immediately pertinent areas include parameters of natural caries immunity; identification of cariogenic bacteria and their serological grouping; immunochemical analysis of their cell-wall antigens and extracellular products; local antibody formation in regional lymph nodes, other lymphoid tissues, and salivary glands; consequences of local administration of antigens; possible protective functions of salivary IgA; and, eventually, more exactly aimed attempts to immunize animals against caries.

CONCLUSIONS

Combined utilization of measures now available or imminent could reduce caries of the crowns of the teeth to the point of negligibility as a public health problem, if public desire were great enough to motivate changes in some of our habits. Universal optimum applications of fluoride and substitution of starchy foods for sugary ones (or even simply judicious consumption of sugar) would alone do most of the job. Sealing of susceptible occlusal areas with adhesive polymers promises to protect the sites where fluoride evidently cannot be maximally effective. It seems unlikely that any single measure will be found sufficient to control this multifactorial disease. Consequently, we must continue the search for new means to increase the caries resistance of teeth, to reduce the cariogenicity of foodstuffs, and to check the deleterious activities of cariogenic bacteria. Anti-caries food additives and antibacterial agents for intraoral use seem to be approaching practicability. Past performance warrants expectation that ongoing fundamental investigations will produce leads for future development and application.

[Extract from]

THE SCIENCE OF NUTRITION

AND ITS

APPLICATION IN CLINICAL DENTISTRY

(Second Edition)

By Abraham E. Nizel, D.M.D., M.S.D., F.A.C.D.*

Relation of Carbohydrates to Disease

There is evidence that sugar and sugar-containing food contribute to several diseases, obesity, dental caries, diabetes mellitus and cardio-vascular disease. Yudkin (1957) has pointed out that there is a better correlation between consumption of sugar and myocardial infarction than with the consumption of total fat or of any particular sort of fat. Some of these diseases are discussed in detail elsewhere in this text.

Certain problems associated with the carbohydrates are due to metabolic abnormalities, as in the case of diabetes mellitus. This syndrome is characterized by the failure of the liver and muscle to utilize glucose properly. This may result from either the lack of insulin or the inactivation of available insulin. The result of this abnormal condition is an increase in lipid and amino acid utilizaton to correct for the energy deficiency. In consequence, there is an accumulation of acetyl CoA which, in turn, recombines to form acetoacetic acid. This latter compound can then either be reduced to beta hydroxy butyric acid or oxidized to acetone. These three compounds are known as the ketone bodies. Accumulation of ketone bodies can lead to a wide variety of deleterious events which can ultimately result in death.

Diet plays an important role in the control of diabetes. Design of diets for such patients must take into account the interrelationships of the nutrients as well as the specific needs of the patient.

A number of other abnormalities are associated with the carbohydrates. These include glycogen storage disease (von Gierke's disease), fructosuria, galactosemia and pentosuria. In each case, as in diabetes, diet plays an important role in controlling the disease and maintaining the patient in a reasonably normal physiological state.

Carbohydrates in the Diet

The multipoint interrelationships of the nutrients give to the living organisms a flexibility which allows it to adapt to a wide variety of environmental conditions. It is evident, however that a living system requires carbohydrate, particularly glucose, in one form or another. The amount of carbohydrate that should be included in the diet is questionable. As indicated earlier, people survive in an adequate manner on diets containing as much as 90 per cent carbohydrate. On the other hand, the Eskimo diet contains only about 20 per cent. The proper amount probably lies somewhere in between.

The pattern and trend of carbohydrate consumption are influenced by the ease and cheapness of production of foodstuffs that are rich in carbohydrates and the general affluence of the society. Actually, one finds that with an increase in income there is a moderate increase in the consumption of calories and protein, considerable increase in the consumption of fat and little change in total carbo-

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hydrate intake. However, with a higher income there is a corresponding increase in consumption of refined sugar. In the wealthiest countries sugar contributes nearly 20 per cent of the total calories consumed. Compared to other food commodities, the world production of sugar is increasing most rapidly. The average consumption of sugar has increased nearly threefold since the beginning of the century.

There is no evidence that one particular source of carbohydrate is better than another. Glucose derived from starch in potatoes or from lactose in milk or from fructose in honey is utilized in exactly the same way as glucose produced by the chemist. Insofar as the diet is concerned, the amount of carbohydrates included in the diet is the important fact.

It has been stated that the ability of man to create civilization is the result of his ability to cultivate and store food. If this be true, then his ability to utilize a variety of sources of carbohydrate has contributed to this success.

The Oral Relevance of Carbohydrates

Six aldose sugars, galactose, glucose, mannose, fucose, "rhamnose," and xylose, have been recovered from the hydrosates of the organic matter of bovine and human tooth enamel (Burgess et al., 1960). Stack (1956) has found that 10 times as much carbohydrate is found in the outermost layer of enamel as in the inner. Furthermore, in pooled "chalky" enamel, which has 3 to 4 times as much organic matter as normal enamel, he has recovered 12 times as much carbohydrate as in normal enamel.

In sound dentin Armstrong (1960) found 0.4 per cent "glucose" units of unrefined carbohydrate material and 10 times this amount in carious dentin. Furthermore, the fractions of carious dentin resistant to collagenase action or autoclaving contain 30 times as much carbohydrate material as sound dentin. This same investigator further hypothesized that the reaction of the dentin matrix with carbohydrates or carbohydrate derivatives probably occurs during the carious process (Armstrong, 1964).

Dental Caries

The historical development of the correlation between carbohydrates and dental caries is detailed in Chapter Twenty-six; but there are a few additional historical notes which are informative and interesting and therefore worthy of being included here.

The Arab physicians of the eighth and ninth centuries A.D. gave an important place to sugar in their pharmacopeia, which may have accounted for the increased cultivation of sugar cane. Since sugar had to be imported from India and Arabia, it was a rare and expensive commodity and considered a luxury. When new trade routes were opened in the fifteenth century by the Portuguese, the price of sugar was lowered and its use for preservation of food became more widespread. The effect of this increased usage of sugar was reflected in Englishmen's bad teeth which "were fairly common at that time among those who could afford to indulge a taste for sweetmeats." In particular, Paul Hentzner observed Queen Elizabeth's black teeth—"a defect the English seem subject to, from their too great use of sugar." (Anonymous [Pertinax] 1964).

Microbiological Experiments.—From a scientific standpoint, perhaps, the classic test tube experiments of W. D. Miller in the last decade of the nineteenth century (1890) can be pointed to as the first of the ongoing investigations these last 75 years on the mechanism of dental caries production. He established that a carbohydrate substrate was necessary for oral bacterial action, and that anaerobic glycolysis by microorganisms provided the acids which decalcify the mineral portions of teeth.

Fosdick and Burrill (1943) pointed out that the only available substrates from which acids can be formed in the mouth are carbohydrates, particularly sucrose and glucose. Furthermore, rapid acid formation giving a pH as low as 4.5 has been shown to occur when sugars are placed on bacterial plaques which adhere to human teeth (Stephan and Miller, 1943).

The evidence that pure sucrose is a strong decalcifying agent was brought out by Jenkins et al. (1959) when they incubated calcium phosphate as well as whole teeth with saliva and sucrose. They found that far more calcium phosphate was

dissolved when pure sucrose was present than the treacle or cane sugar, partly because the last two substances are heavily buffered.

Animal Experiments.—The mandatory presence of carbohydrates in the diet (Shaw, 1954) and its focal contact with the tooth (Kite et al., 1950) are now proved. In Shaw's experiment it was demonstrated that not only did rats have to be fed some carbohydrate in the diet (more than 5 percent) to develop decay, but even sialoclectomized rodents that usually develop extreme caries when fed a cariogenic diet were caries-resistant when carbohydrates were omitted from their diets. In the experiment of Kite and his associates, caries did not occur in even 1 or 13 caries-susceptible animals fed a high-sugar diet by stomach tube; whereas all their littermates, which were fed the same type of cariogenic diet by the usual oral route, developed some caries.

The chemistry of the carbohydrate, mono-, di- or polysaccharide, is also an essential consideration with respect to the degree of its cariogenic action. For example, sucrose or glucose supplements are very active cariogenic agents but starches and dextrins are not (Schweigert et al., 1945; Shafer, 1949). The reason that starch may not be very cariogenic is that the large starch molecule does not penetrate and diffuse through the dental plaque so readily as the smaller di- and monosaccharides. Starch is more likely to remain on the outer surface of the plaque where it can be washed away and eliminated. On the other hand, the sucrose that has diffused through the plaque will degrade to acid beneath the plaque and react with the tooth surface. In rats fed a sugar supplement, caries was a consistent finding (Koenig and Grenby, 1965), but when wheat starch, white or whole kernel flour, and white flour replaced by brown or fine offals were fed as dietary supplements instead of sugar, caries was practically negligible.

Another important observation that has been made in experimental animals with regard to dietary carbohydrate and dental caries is that the cariogenic effect of sucrose is accentuated when its feeding is initiated during early tooth formation, development and calcification (Sognnaes, 1948; Volker, 1954; Steinman and Haley, 1957). The authors postulate that sucrose is replacing a protective mineralizing factor present in trace amounts, perhaps, in natural foods which are more beneficial to the tooth during its maturation. A significant imbalance in the phosphate: carbonate ratio created by decreased phosphate and increased carbonate, was found in the enamel of molars of weanling rats that received sugar solutions intraperitoneally during the later part of the suckling period (Lnoma, 1961). This lowered phosphate: carbonate ratio has been associated with increased caries susceptibility (Sobel et al., 1960).

The level of sucrose and glucose in the diet has also been found to be a significant consideration in the amount of caries produced. For example, Mitchell et al. (1951) found that animals fed a ration with 45 per cent sucrose had more caries than those fed rations with only 15 or 30 per cent. Likewise, Keyes and Likens (1946) found that animals fed sucrose at 40 and 60 per cent levels showed more caries than those fed sucrose at a 20 per cent level.

The physical form of the carbohydrate is another variable which influences the extent of caries production. Sugar in solid form has been shown to be more cariogenic than liquid sucrose. Of 13 rats that were fed granulated sugar, only 2 remained caries free. However, 7 of 13 littermate rats were without a single carious lesion when a sucrose solution was ingested (Haldi et al., 1953).

Clinical Observations.—When a primitive, native-type food intake pattern is replaced by a civilized sophisticated one, dental caries will increase. This has been shown with the Bantus (Oranje et al., 1935) and Eskimos (Waugh, 1930) and more recently with the natives of Tristan da Cunha (Holloway et al., 1963). The diet of the Tristan da Cunha islander in 1938 consisted mainly of two staples, potatoes and fish. The average potato consumption per person was about 4 times higher, and the average fish consumption was about 3 times greater than that of the English. The natives also ate young sea birds, red crowberries, apples and pumpkins, and sparingly of beef, mutton, milk and eggs. In the last decade, this dietary pattern has changed radically because imported foodstuffs like flour, sugar, condensed milk, jam, dried and canned fruit, canned fish and sweets were made available. They now consume an average of 1 pound of sugar per week per person as compared to 1938 when they had no sugar. The change in dietary pattern has been accompanied by a simultaneous change in dental

health. In 1938 Sognnaes found not a single carious first permanent molar even on radiographic examination in any of the young people under 20 years of age. On the other hand, in 1962 when Holloway et al. made dental examinations in a comparable age group, they found that 50 per cent of the teeth were carious.

In still another large scale general population study the influence of caries proneness of the kinds of foodstuffs eaten prior to tooth eruption has been noted. The incidence of postwar dental caries and the consumption of sugar during the war showed a high degree of correlation (Sognnaes, 1948; Toverud, 1949). Molars of Scandinavian children were made caries resistant during the war period when less refined foods were available. Three to 5 years later when the teeth were exposed to a more cariogenic diet, the innate resistance was sufficient to ward off the local attacking forces of increased sweets. Likewise, the incidence of decay in first permanent molars was found lowest in German children who 5 years previously had been on a low sugar ration.

In addition, there have been clinical trials in orphanages, homes, etc., that have added more evidence of the inverse correlation between sugar and caries. Some of these studies have been explained on a developmental or systemic basis; others have given more credit to the local environmental mechanism. The answer probably lies somewhere between both these philosophies or explanations. For example, in the majority of children ill with diabetes mellitus who ate more liberal amounts of milk, eggs, meat, vegetables and fruit than most children, there was little or no extension of caries for years (Boyd, 1943). The small number who failed to observe their dietary regime experienced a much higher rate of caries. The children who were put on this low sugar diet early had less caries than those who started the diet later. Similarly, Howe et al. (1942) showed that children who followed dietary instructions and ate a diet of high nutritional quality with simultaneous lowering of carbohydrate content had significantly less tooth decay than comparable children who were not so counseled. On the other hand, Koehne and Bunting (1934) added large amounts of carbohydrates in the form of sugar or candy to the diets of children and found an increase in caries. This emphasized a local extrinsic factor as the predominating mechanism.

Not only has clinical caries research established and confirmed the animal findings with respect to the hypothesis that carbohydrates are essential for caries production, but there is some very good evidence in humans that the type of carbohydrate, starch versus sugar, as well as the physical form and frequency of usage are each important variables in the magnitude of caries experience to be expected. Individuals who suffer from hereditary fructose intolerance, which is an inborn error of metabolism, have a deficiency in the enzyme fructose-1-phosphate aldolase. They can tolerate starch but not sucrose and fructose; therefore, they avoid sugars and eat plentifully of foods like bread, noodles and potatoes instead. These patients have nearly caries-free mouths in spite of the large amounts of starchy foods that they eat (Froesch et al., 1963).

The well-controlled Vipeholm study is probably the classic illustration of the importance of the effect of form and frequency of carbohydrate ingestion on caries development in humans (Gustafsson et al., 1954). A long-term, 5-year, nutritional study was carried out on 436 mental patients with a mean age of 32 who were confined, practically permanently, in an institution in Vipeholm, Sweden. Diets were carefully supervised as to preparation, and nurses were able to insure cooperation of the patients in following the experimental prescriptions.

The first year constituted an adjustment period in which a base line caries index was established and the patients consumed a diet rich in vitamins and other protective foods four times a day with no candy or chocolate. The next four years consisted of the carbohydrate study period in which ten groups were fed the same basal diet, but they differed from each other in that some groups had increased amounts of sugar *at mealtime* and others had increased amounts of sugar *between meals*. There were four main groups:

1. Basal diet
2. Basal diet and additional sugar in solution at meals
3. Basal diet and additional sugar in bread consumed at meals
4. Basal diet and additional sugar in the form of sweets consumed between meals.

Those who were on the basal diet (the control group throughout the study) had a low caries activity. In those groups who had as much as 300 grams of sucrose added to the meal in liquid form as a beverage or in food preparation, the

caries activity was only slightly increased. This is about twice the mean sugar consumption of most Western countries. It is interesting to note that the same slight caries activity increase was noted in the group who were given bread *at meals*, which contained only 50 grams of refined sugar.

In all groups other than those on the basal diet, there was a very significant increase in dental caries. Even if there was a small amount of additional sugar added, such as those who ate candy between meals, there was a marked increase in caries activity, indicating that quantity of sugar was not the all important factor to account for this result. Furthermore, when the sweets were withdrawn from between-meal periods, the caries activity decreased to the level of the initial preparatory period.

The important conclusion from this experiment is that if sugar with only a slight tendency to be retained, such as sucrose solution, was ingested *at meals* or if sugar-rich bread which has a strong tendency to be retained was consumed *at meals*, the risk of increasing caries activity was least. However, when sugar with a strong tendency to be retained in the mouth was eaten *between meals* frequently, the risk of increasing caries activity was greatest.

Lundqvist measured the time sugar could be detected in the saliva of the participants of the Vipeholm study. In Figure 4–6 it can be seen that in those groups who ingested sugar at meals, regardless of whether it was the control group, or the sucrose group, or the bread group, only four peaks of sugar in the saliva were noted, corresponding to the four meals. Of special interest is that the sucrose groups, who ate twice as much sugar (but at meals) as the control group, had an identical salivary glucose level.

In short, dental caries activity increased in connection with consumption of sugar in sticky form between meals, but it decreased when the consumption was interrupted. Furthermore, when sugar was consumed in solution at meals, in amounts twice the Swedish average consumption, no increase in dental caries was observed.

The results of Gustafsson's and Lundqvist's studies prove several points: (1) sugar exerts its caries-promoting effect locally in the mouth, (2) starchy foods like bread are not so cariogenic as the disaccharide sucrose, (3) the amount of sugar is not of paramount importance, (4) the form and composition of the sweets is critical (retentive worse than nonretentive), and (5) the frequency of usage is a prime factor in caries activity. These conclusions, particularly about the importance of *at meal* or *between meal* timing of sugar intake, are confirmed by the result of Mack (1949), King et al. (1955), Jay (1947) and Potgieter et al. (1956). The first two investigators reported that when extra sugar was eaten at meals no increase in caries was noted. In the last two studies sugar was given between meals and caries increased.

In summary, all these in vitro animal and human data certainly point to the adverse effect of carbohydrates particularly sucrose, on dental caries. But it is recognized that food habits and ingrained cultural practices are difficult to change, particularly when dealing with a disease like dental caries, which is not a matter of life or death. Although some of our attention is being directed to understanding the psychological and social aspects that influence a patient's dietary pattern, our actual management will be concerned in the future with substituting for carbohydrate foods with less cariogenic potential than sucrose.

PERIODONTIUM

There is some preliminary evidence that carbohydrate foods, particularly those that are readily retained and easily fermented, play an important role in the etiology of periodontal disease. The incidence of the periodontal syndrome was markedly increased in rice rats (which are constitutionally prone to this disease) when fed highly cariogenic diets containing 67 per cent sucrose. Those animals fed a carbohydrate-free ration experienced a major reduction in periodontal soft tissue lesions and moderate reduction in bone loss. Furthermore, animals that were fed a diet with reduced dietary carbohydrate and increased lard content showed a somewhat lower reduction of periodontal lesions when compared to those fed high sucrose diets. It is possible that the periodontal syndrome produced by the dietary regimes may be really a reflection of bacterial activity and the availability of optimal nutrition for the growth of these microorganisms (Anskaps et al., 1957).

Another bit of indirect evidence that high carbohydrate diets adversely affect gingival health and even wound healing can be found in the animal studies on protein-free (Stahl, 1962) and low-protein (Stahl, 1963) diets. Actually, these animals were fed diets with 70 to 75 per cent starch content and, in both instances, showed delay in connective tissue and bone repair after being wounded. Furthermore, there is the finding of Frandsen et al. (1953), that rats fed on diets containing no protein and 86 per cent sucrose showed severe osteoporosis and increased rate of bone resorption. Stahl's findings and those of Frandsen and his associates might be interpreted as the result of a dual dietary aberration, namely, a protein deficiency compounded by an excess carbohydrate diet. The more important of these two dietary variables in the etiology of the disease was not demonstrated.

Human Data—A deterioration in the periodontal health of Tristan da Cunha islanders from 1938 to 1962 was noted by Holloway et al. (1963). The diet of those islanders had changed from no ingestion of sugar in 1938 to 1 pound per person per week in 1962. Sognnaes reported in 1938 only 10 per cent of adult population showed advance periodontal disease with bone loss and gingival recession. In 1962 the percentage of the population afflicted with this disease had risen to 32 per cent.

The possibility that carbohydrate metabolic patterns might be related to the integrity of the periodontium was investigated recently (Shannon and Gibson, 1964). Since the subjects of this research were healthy males with relatively mild periodontal disease, the object of the study was to use the oral glucose tolerance test as an index of susceptibility rather than a chemical finding correlated with the presence of advanced disease. They found no correlation between the oral glucose tolerance test and periodontal health.

In conclusion, our knowledge on the relation of carbohydrates to periodontal disease is still sparse, but the initial experimental results do seem to hold some promise for developing a tenable hypothesis that this nutrient has periodontal disease-producing potential.

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[Extract from]

NUTRITION IN ACTION, 3d Edition

Nutrition Begins With Food

By Ethel Austin Martin

TEETH

Teeth and jaws are part of the skeleton: Teeth merit serious attention, because dental caries is the most widespread of all chronic diseases. Almost 100 percent of the population of the United States is afflicted with it in some degree. Despite research conducted over many years on animals and man, the cause or causes of dental decay have not been defined precisely. Nutrition is a basic factor in respect to caries control and to the solution of the dental health problem.

Dental decay results when oral bacteria act on teeth that are susceptible to decay. Certain microorganisms are prevalent in tooth surface areas protected from usual cleansing procedures. Carbohydrates, especially table sugar, accumulated on the teeth and acted upon by the organisms, readily ferment, and the acid generated by this action penetrates the tooth enamel, thus causing tooth decay. Dental decay in susceptible teeth occurs in direct proportion to the quantity of fermentable carbohydrate in the diet, but frequency of intake and consistency (form) of the food are especially important in the decay process. Carbohydrates that are sticky and adhere to the teeth are more destructive than those in liquid form. If they are eaten at very short intervals the decay process can be practically continuous.

A well-balanced, nutritionally adequate, satisfying diet is important for good nutrition under all circumstances. However, in caries control it serves a special purpose. Such a diet would include adequate amounts of protein, calcium, and phosphate, plus moderate amounts of sugar, and its satisfying quality would tend to discourage excessive nibbling. A careful controlled study with children has shown that, as their diets became more nearly adequate, there was a tendency for the children to adjust voluntarily to lower sugar intake.

Dental caries is more prevalent in certain geographic areas than in others, regardless of the economic status of the people or the adequacy of their diet. Efforts to solve this puzzle eventually led investigators to the mineral element fluoride as the critical factor. Fluoride is now regarded as a specific nutrient of proven value in producing decay-resistant teeth. Research has shown that a desirable amount of fluoride (one part per million, optimal), occurring naturally in a community water supply or a water supply adjusted properly in fluoride content, can provide a substantial degree of immunity to tooth decay.

NUTRITION EDUCATION—1973

HEARINGS

BEFORE THE

SELECT COMMITTEE ON NUTRITION AND HUMAN NEEDS

OF THE

UNITED STATES SENATE

NINETY-THIRD CONGRESS

FIRST SESSION

PART 4—TV ADVERTISING OF FOOD TO CHILDREN

WASHINGTON, D.C., MARCH 6, 1973

Series 73/NE4

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Part 2 and 2A—Overview—The Federal Programs, Dec. 6, 1972; with Appendix.
Part 3—TV Advertising of Food to Children, March 5, 1973; with Appendix.
Part 4—TV Advertising of Food to Children, March 6, 1973; with Appendix.

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TUESDAY, MARCH 6, 1973

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NUTRITION EDUCATION

Television Advertising of Food to Children

TUESDAY, MARCH 6, 1973

U.S. SENATE
SELECT COMMITTEE ON
NUTRITION AND HUMAN NEEDS
Washington, D.C.

The Select Committee met at 10:40 a.m., pursuant to call, in room 1318 of the Dirksen Building; the Honorable George McGovern, chairman of the committee, presiding.

Present: Senators McGovern, Cook, and Schweiker.

Staff members: Kenneth Schlossberg, staff director; Vernon M. Goetcheus, senior minority professional staff; and Elizabeth P. Hottell, minority professional staff.

Senator MCGOVERN. The committee will come to order.

Is Mrs. Peggy Charren and Mrs. Sarson here?

Mrs. CHARREN. Yes.

Senator MCGOVERN. I am sorry for my late arrival here. The Committee on Agriculture was meeting and as there was a nomination under consideration I had to be there.

We will now proceed with our first witness.

STATEMENTS OF PEGGY CHARREN, PRESIDENT; AND EVELYN SARSON, EXECUTIVE DIRECTOR, ACTION FOR CHILDREN'S TELEVISION

Mrs. CHARREN. I am Peggy Charren, president of Action for Children's Television, and with me is Evelyn Sarson, ACT's executive director.

Action for Children's Television—ACT—is a national organization of parents and professionals working to end the commercial exploitation of children on children's television. We are here today representing many people who are missing from these hearings, people who have tried to make their voices heard at the FCC and in Congress, who have tried to express their concerns about what television is doing to their own children, and who have urged action in this small and specific area. These people are the viewers, the public, the teachers in the classroom, who write to us for information on how to help young children handle the commercial barrage on children's programs, the pediatricians and other physicians dealing with children, who ask us what they can do to stop TV selling to children. And we are here today to speak for the thousands of parents who ask how often they should be expected to have to say "no" to the repeated demands for oversugared foods advertised to children on TV.

We cannot bring the 100,000 individuals and groups who wrote to the FCC on ACT's petition to these hearings to tell you personally what they feel. We cannot bring the millions of individuals who make up the major national organizations who support our position on the unfortunate consequences of TV selling directed to children—organizations, including the American Academy of Pediatrics, the National Conference of Christians and Jews, the American Association of University Women, the National Health Association, and the National Association for the Education of Young Children.

Action for Children's Television has already initiated some petitions and rulemaking designed to protect children from exploitation by TV commercials.

In January 1970, ACT petitioned the Federal Communications Commission to eliminate commercials from children's television programs and to stop host-selling. This petition formed the basis for a proposed rulemaking and inquiry upon which no action has yet been taken.

In November 1971, ACT petitioned the Federal Trade Commission for a Trade Regulation Rule to eliminate the vitamin pill advertising on children's TV programs. In April 1972, ACT also submitted to the FTC complaints against Miles Laboratories, Hoffman-LaRoche, and Bristol-Myers for their vitamin pill ads on children's TV. Although no action has yet been taken by the FTC, as of October 1972, all three companies had withdrawn their pill ads from children's TV programs. ACT feels regulatory action is essential to keep these ads off the air.

In December 1971, ACT petitioned the FTC to eliminate TV toy ads directed to children; no action has yet been taken.

And in April 1972, ACT petitioned the FTC for a Trade Regulation Rule to eliminate food advertising on children's television programs on the grounds that all food advertising directed to children is misleading and unfair. To date, no action has been taken on this food petition.

ACT accepted the invitation of the U.S. Senate Select Committee on Nutrition and Human Needs to testify here, today, because ACT wants you to know that the parents of America are extremely concerned and that they feel helpless.

A child watching CBS–TV, channel 7, in Boston, between 7 a.m. and 2 p.m. on Saturday, October 28, 1972, would have seen 67 commercial messages urging him to eat or drink sweetly flavored products. Nearly 10 times each hour the child would have been reminded that the presence of sugar in the mouth is a sweetly gratifying experience.

ACT Filing Complaints With FTC

ACT would like to take this opportunity to announce that we are filing with the Federal Trade Commission today eight complaints—the first in a series against major companies—that advertise on children's television, against the CBS television network, and WNAC–TV Boston for unfair and misleading advertising to children.

The complaints cite: Kellogg's for Pop Tarts and Danish-Go-Rounds snack foods and Froot Loops cereal commercials; General Mills for Baron Von Redberry and Sir Grapefellow cereals and commercials; General Foods Post Division for Fruity Pebbles and Cocoa Pebbles cereals commercials; Quaker Oats Co. for Vanilly Crunch cereal commercial; Hershey for instant milk additive commercial;

Curtis Manufacturing Co. for Baby Ruth commercial; and Mars Manufacturing Co. for Milky Way candy commercial.

Accompanying these complaints is a 23-page additional filing to ACT's original petition to the FTC to eliminate edibles advertising directed to children—on which no action has yet been taken.

Many of you on this committee are clearly cognizant of the harmful effects of the sugar-rich diet which prevails in our country. There can be no doubt that this diet is a habitual form of behavior, that it is learned during childhood, and that it is unlearned only with extreme difficulty.

The role of television advertising in establishing this habitual diet during childhood is a major one. The amount of time children spend watching these commercials for sugared products, the frequency with which they appear, and the amount of money spent by the manufacturers to air their commercials are impressive statistics. Taken together, they are a strong indication of the relationship between advertising and eating habits. We would be foolish to wait for the studies to tell us that there is a relation between advertising and eating habits. We would be foolish to wait for the studies to tell us that there is a relation between what children watch and what they do; we can be as sure that this relationship exists as are the advertisers who depend on it to sell their client's products.

A few years ago, before consumerism was in bloom, company executives were more willing to talk frankly about the purpose of their ads and how they felt about aiming the ads at the "child market."

> There is no real formula for good ads. Our primary goal is to sell products to children, not educate them.[1]
>
> When you sell a woman on a product and she goes into the store and finds your brand isn't in stock, she will probably forget about it. But when you sell a kid on your product, if he can't get it, he will throw himself on the floor, stamp his feet and cry. You can't get a reaction like that out of an adult.[2]

Despite the well-documented problems caused by overconsumption of sugar, the food industry keeps on marketing new sweet snacks and cereals as if it had never heard the messages coming from doctors, dentists, and the White House Conference:

> Candies, confections and beverages containing sucrose should not be ingested by children between meals. Food manufacturers should limit sucrose in foods primarily intended for consumption by children. Education of the consumer on this point is essential.[3]

Four Most Cariogenic Groups

In spite of this admonition, the list of products sold to children over television is dominated by the four most cariogenic groups of foods: Caramel, chocolate, cookies, and pastry.

On the morning of October 28, 1972, children were urged to eat candy bars such as Milky Way, Baby Ruth, Kit-Kat, Hershey Bar, Junior Mints, Butterfingers, Mr. Goodbar, and M & Ms; and snack foods such as Kellogg's Danish-Go-Rounds. Other such foods regularly advertised to children include: Keebler Chips Ahoy, Oreos, Devil Dogs, Ring-Dings, Yankee Doodles, Yodels, Big Wheels, Hostess Cupcakes,

[1] Cleo Hovel, Vice President and Executive Creative Director, Leo Burnett Company, at the time agency for Nestle's Quik and Kellogg Cereals, "Advertising Age," July 19, 1965.
[2] Jerry Riggiein, Assistant General Advertising Manager, Oscar Mayer and Company, Madison, in "*Advertising Age*," July 19, 1965.
[3] From the White House Conference on Food, Nutrition and Health, Final Report, Page 48.

Hostess Twinkies, Nabisco Sugar Wafers, Charm Big Tops, Holloway Milk Duds, Holloway Black Cows, Nestle Crunch, Nestle $100,000 Bar, Nestle Triple Feature Bar, Tootsie Pops, Tootsie Rolls, Life Savers, Turkish Taffy, Clark Bars, and Zagnut Bars.

A dose of sucrose will produce decaying acid between the plaque and the tooth enamel within 5 minutes. Even if the sucrose is in liquid form and washes away immediately, the acid will persist for up to 20 minutes until natural buffering agents in the saliva neutralize it.

If, however, the sugar is eaten in a form that makes it adhere to the tooth surfaces, the acid production will continue so long as the sugar is in contact with the tooth. The stickiness of the particular food has been shown by studies to be the major determinant of its cariogenicity.

Dr. Abraham Nizel reported on a study of several hundred 5-year-olds which found that:

> The children experienced a caries increase which had a linear relation to the number of between-meal snacks they ate. Specifically, those who ate one snack had a caries score of 4.8: two snacks, 5.7; three snacks, 8.5; and four or more snacks, 9.8. It appears that the most important difference between cariogenic and noncariogenic agents is *not the amount of sugar ingested but the frequency of intake.*[4]

The importance of this study lies in the fact that it points an accusing finger at one particular group of sugared foods—snacks. And by now we are not surprised to find that this group dominates the list of products advertised to children.

The study tells us that a child who eats small quantities of sugar on several occasions throughout the day is much more likely to develop caries than a child who eats one sugar-rich meal. However, these advertisers are simply concentrating on products which, for the most part, are between-meal treats. They are, in addition, delivering their message at regular intervals throughout the between-meal times of day. On Saturdays, most of these ads come on between 9 a.m. and noon. On weekdays, they appear between 3 p.m. and 6 p.m.

In view of the findings concerning frequency of intake, the repetitive between-meal advertising of snack foods must itself be regarded as a contributing factor to the dental caries problem. And, as previously stated, with the example of October 1972, we find snack foods well-represented in the list of TV commercials delivered to children.

Dental Caries- A Health Problem

According to the bureau of community dental programs of the department of health and hospitals in the city of Boston, dental caries is the most pervasive health problem among children in this country; 98 percent of the Nation's children suffer from tooth decay.

Recently, the bureau conducted a survey of 1,000 children in Boston public schools and found that 90 percent of them were in need of dental care for caries. In another study, the bureau found that among children up through the age of 19 in the metropolitan area of Boston, there are approximately 4,000 new cavities every day.

There is ample nutritional evidence to prove that sugared snack foods offer very little in the way of body growth and maintenance and that they even have a negative effect of robbing the appetite for more nourishing foods.

[4] Dr. Abraham Nizel, *Nutrition in Preventive Dentistry: Science and Practice.* 1972. p. 47.

As Dr. Jean Mayer, Professor of Nutrition at Harvard University's School of Public Health, has stated:

> The best advice I can give about sugar in any form is: Eat less.[5]

Doctors, dentists, and nutritionists deplore the habit which American children have of snacking on sweet, nonnutritional foods between meals. Yet that habit is encouraged and reinforced daily on children's television.

In his book, "Nutrition," George H. Beaton says:

> Probably the two most common defects in children's eating habits in North America are the overgenerous uses of very sweet foods in meals and the frequent snacking between meals with foods high in sugar. It is well known that sweet snacks shortly before a meal depress the appetite markedly . . . It seems a pity that the so-called "quick energy" of sugar is exploited so vigorously. Some mothers are under the misapprehension that their children need sweets for this reason. As a matter of fact, any food will provide quick-enough energy and sugar is our poorest food, bar none.[6]

Mothers are encouraged not to fall into the "quick energy" trap but to provide their children with wholesome snacks. In other words, parents must act in direct opposition to the volume of ads their children watch on television.

> At a time when the body is growing at a more rapid rate and body structures are developing, the need for quality food is crucial. There is no room in the diet for "empty caloric" foods—those represented by most sugar-coated and snack foods. At this time children need balanced diets providing the nutrients needed for growth.[7]

Many parents who are at least partially aware of the harmful effects of sugar, prohibit the intensive use of sweets by their children. However, the television ads come fast and furious, coaxing children to try Mars bars, M & Ms, and sweetened cereal as between-meal snacks. Were children to eat as much candy and sweetened snacks as the television suggests, they would never have the appetite for anything else.

Adults whom the children respect—father figures, famous athletes, competent older children—are hourly heard encouraging children to eat candy bars, drink soft drinks, and make friends by sharing snacks. The familiar cartoon characters, the friendly announcer, the superstars all entice children to try the latest gooey, munchy, crunchy, sweet snack.

Cereal—one of the hallowed "basics"—a food children are taught to eat as part of a balanced diet, has become saturated with sugar and is advertised, in many cases, only on its questionable merit of being "supersweet." Dr. Jean Mayer warns that many of the children's sweetened cereals are 50-percent sugar—as much as some candy bars.

Conflict Between Parents and Children

Food advertising directed to children sets up a conflict between the parent and the child and, in fact, between the child and any number of authority figures—doctors, dentists, and teachers, as well as parents.

[5] Dr. Jean Mayer, article in *The Boston Globe*, Nov. 8, 1972.
[6] George H. Beaton, "Nutrition, A Comprehensive Treatise," (New York: Academic Press, 1966), p. 61.
[7] Ivalee McCord, Chairman of the Child Development and Family Relations Section of American Home Economics Association in a letter to ACT, Feb. 23, 1972.

In a study of television viewing by children conducted for the Surgeon General's Scientific Advisory Committee on TV and Social Behavior, it was found that food products advertised on television are more frequently requested by the child than other products.[8] Because of these frequent requests, parents are forced into a position of not only refusing the child and entering into a conflict because of it, but they also need to contradict the authority of another adult who is telling the child that it is good to buy "Pink Panther Flakes."

A pilot study on "Mothers' Attitudes Toward Children's Television Programs and Commercials," carried out by Daniel Yankelovich, Inc., found that: "In all income strata, the constant duel of children asking for things and mothers having to say "Yes" or "No" creates, mothers feel, an unhealthy environment and relationship.[9]

As the President of the American Academy of Child Psychiatry, Dr. Sidney Berman, put it:

> The American Academy of Child Psychiatry, as an organization primarily devoted to the mental health needs of all children, is deeply concerned with the exploitation of children by many advertisers of the television media. Many of these advertisements are directed to the attention of children in order to bring pressure to bear upon the parents to purchase these products—primarily food items of questionable nutritional value and toys which add nothing to the child's physical and mental development . . . Furthermore, the advertisements encourage confrontation and alienation on the part of children toward their parents and undermine the parent's child-rearing responsibilities.

Parents can react to this subversion in several ways. A few stick to their guns, taking a hard line nutritionally. They are few and far between. Many battle it out with the child, giving in to an unwholesome cereal here, a candy bar there. They shout and lose their tempers while the children whine, beg, coax, wheedle, and often buy the harmful sweets against their parents' wishes and consume them secretly.

The majority of parents, however, are badly informed as to the harmful effects of excessive sweets. They are as gullible about the advertising as the children are and make little or no effort to regulate the child's sugar intake. Because more soft drinks, candy, and snack foods are advertised than other types of food, their children eat more soft drinks, candy, and snack foods. The older these children get, the more purchasing autonomy they are awarded and the more harmful snack foods they buy.

A medium which could be a powerful educational tool to inform the American public of good health and nutrition is instead a vehicle for falsehood, misinformation, and misleading persuasion.

We have argued that the continual reinforcement of a taste for sweets in children through TV advertising presents several dangers to the health of children; the most significant are dental caries, exclusion of more nutritious foods from the diet, obesity, and other health problems that arise in adulthood as a result of a taste for sweets acquired during childhood.

These dangers can be minimized through the vigilance of parents who possess the knowledge, time, and energy to protect children from bad habits. This vigilance requires a parent to supervise regular tooth brushing, to provide the child with a properly nutritious daily diet, and to limit the amount of sweets that the child may eat.

---

[8] E. A. Rubinstein and George Comstock, Television and Social Behavior, ol. IV. Washington, D.C.: U.S. Government Printing Office, 1972, p. 518.

[9] Daniel Yankelovich, "Mothers' Attitudes Toward Children's Television Programs and Commercials," March, 1970.

Nutritional Education for Low-Income Groups

There are, however, many families in which the social, educational, and economic disadvantage make it impossible for parents to assume proper responsibility for protecting their children from bad food habits. Their parents' lack of knowledge, lack of time, and lack of income all conspire to make children in these families particularly vulnerable to the ill-effects of TV-advertised sweetness.

Nutritional ignorance, including ignorance of the relation between tooth decay and sweets, is found most widely in low-income families, where parents generally have had far less education than members of higher-income groups. Low-income parents are therefore less aware of the relationship between diet and health. Their need is for information which educates them to provide themselves and their children with a nutritionally sound diet.

Nutritional education is now recognized as a need of the highest priority for low-income groups. Government agencies at all levels are trying to fill this need with programs designed to raise awareness of the nutritional value of different foods and to promote sensitivity to the dangers of dietary inadequacies.

The advertisements of sugared food products regularly viewed by children result in a reinforcement of poor nutritional habits and in this way represent a concerted effort to undermine the Government's educational effort. Overconsumption of sugar is, for several reasons, one of the principle dangers of which the educational programs seek to make people aware. Dental caries, obesity, protein and vitamin deficiency, as well as increased susceptibility to heart disease are all likely consequences of a sugar-rich diet. And, yet, the most powerful and pervasive information source in the lives of low-income children—the television set—is systematically developing in them a taste for sugar-rich foods.

The Office of Child Development, HEW, recently announced a grant to supply a special series of 3½ minute segments on subjects such as health, nutrition, exercise, and emotions, to be aired exclusively on CBS–TV's "Captain Kangaroo." One wonders how much influence the segments dealing with nutrition will have when they must compete with the "eat-this" message in ads for: Kellogg's Toasties, Rice Krispies, Sugar Smacks, Raisin Bran, Corn Flakes, Froot Loops, Sugar Pops, and for Pop Tarts, Hershey Instant Chocolate, Sugar Frosted Flakes, and Hershey chocolate bars, all of which were "Captain Kangaroo" ads the week of April 5–9, 1971.

The Vulnerability of Children

Where children are concerned, counter ads or public service spots or educational program segments which provide correct nutritional information do not necessarily offset the damage done by misleading food ads.

The law has traditionally recognized that children require special protection:

Children are not allowed to buy alcohol or cigarettes;

Children may not enter into contracts without the assistance of an adult guardian;

Children are not allowed to drive a vehicle until the age of 16;

To vote until the age of 18; or
To own a credit card until the age of 21.

Yet, in the world of television, a child is treated as an adult from the day he begins watching television.

There are basic nutritional questions that a consumer should consider when evaluating a food purchase. Such information is usually not available from present TV commercials. But even if it were, it would be of no help to the child because he is not yet mature enough to phrase such questions, or even think of asking them. We recognize in real life that our children are not sophisticated enough to plan the family's meals, and yet, on television, we expect them to show the most amazing degree of sophistication in coping with the barrage of demands from the most persuasive selling medium of all.

Dr. Richard Feinbloom, acting medical director, family health care program, Harvard Medical School, and acting chief, Child and Family Health Division, Children's Hospital Medical Center, Boston, gives a clear summary of children's vulnerability to ads.

> To children, normally impulsive, advertisements for appealing things demand immediate gratification. An advertisement to a child has the quality of an order, not a suggestion. The child lacks the ability to set priorities, to determine relative importance, and to reject some directives as inappropriate . . . The child responds as much to the setting as to the object advertised, unlike the adult, and is unable to separate the two. Thus, the real toy is very often found by the child to be disappointing . . . The child cannot judge the monetary value of advertised merchandise, an intrinsic and crucial part of the adult's evaluation and consideration.

Dr. John Condry, professor of human development and psychology, Cornell University, N.Y., has pointed out that it is unreasonable to expect children to be able to make reasoned consumer choices.

> . . . Children cannot be expected to choose that which is best for them simply because they are children, and have yet to develop the maturity of judgment necessary to anticipate the consequences of a complex choice.[10]

In practice, television is forever tempting children to make choices by appealing to their fondness for sweet things and attractive toys and their need to be loved. While adults can in some measure discount the appeals made by persuasive commercials, the child is helpless before such appeals because he cannot cope with them.

Conclusion

It is ACT's position that television could be an effective tool in promoting better nutrition for both children and adults. For adults, fuller disclosure of nutritional and other information might assist them in making sound decisions about their family's food consumption. For children, regulations should insure that they are exposed only to beneficial nutritional information, should they happen to see ads on adult programs. However, on television programs designed specifically for children, there can be no compromise. Children are never the proper targets for an advertising campaign, no matter how much correct counterinformation is available elsewhere.

ACT has argued that the advertising of foods directed to children takes unfair advantage of children's lack of sophistication and maturity; that it increases parent-child tensions; that it produces nutritional miseducation, which is difficult to unlearn; that the food habits

[10] Testimony before the FTC, November 1971, p. 11.

promoted by TV ads aimed at children teach that one eats because it is fun, it is sweet, or it is the way to get a toy, rather than that food is vital to health and well-being.

Advertisers and broadcasters may have a strong economic interest in continued advertising to children, but this exploitation of our children is clearly not in the national interest.

Unless there is vigorous action to prevent the continued exploitation and miseducation of the Nation's children via food ads, we can expect a continued growth of heart disease, hypertension, and poor dental health—the diseases that result from poor eating habits established in childhood, which cripple and kill in adulthood.

We are grateful that this committee has chosen to focus public attention on the vital issue of advertising to children through these hearings. We are hopeful that your efforts, unlike so many similar hearings in the past, will result in action to provide protection for our youngest and most vulnerable citizens.[11]

Thank you.

Frustrated by Lack of Industry Response?

Senator McGovern. Thank you very much, Mrs. Charren and Mrs. Sarson.

I think you have given the committee an excellent presentation on a problem that we are interested in.

I would like to direct a couple of questions to you.

I get two feelings from your testimony; one is the feeling that you are locked in a very grim battle with the advertising industry and the food industry and the broadcasters, as well as the Federal regulatory agencies.

The other feeling I get is your belief that while justice is on your side, that somehow or other, you are being terribly frustrated by a lack of response by the industry people.

Is that a fair summary of your position?

Mrs. Charren. I would say it was excellent.

Senator McGovern. How do you account for the fact that on a problem where health professionals and doctors and dentists and nutritionists are in general agreement, they deplore the habit of children snacking on sweets between meals, that all these people have so little influence in modifying the television advertising?

Mrs. Charren. I think it is a question of timing. I think the whole thing happened very slowly. Ten years ago there were few ads directed to children on television. It was not understood what a good salesman the child made.

But now that the advertising profession is aware of how they can use children, they are using them more and more, and it is only in the last 2 years that the attention of the country was called to this problem, really.

Mrs. Sarson. In a study we had done by Dr. William Melody on the feasibility of paying for children's television without commercials, he outlined the history of children's television. At the beginning, no one would have dreamed of putting commercials on these programs for children because they didn't realize that children could be sold to.

[11] See also, appendixes to statement, pp. 411-16.

TV Commercials to Children Began in 1952

In 1952, Miss Frances, of Ding Dong School, did the first personal commercial during a children's program. That has multiplied to the state we are in now, and as parents become aware of what is happening, the public is becoming informed. As you said, the thing is coming to a crossroads where on the one hand the parents consent to the wishes of the children; and, on the other hand, it is the entrenched industry in a position to which it has grown to great affluence—and looking at the affluence they have gained and wondering what they can do.

Mrs. Charren. I think the problem is that it is so effective to advertise to children, that no company is willing to give it up without a battle.

The other problem, particularly in food advertising to children is when I speak to manufacturers about why it is that it seems the worst cereals are the cereals sold to children, that the companies make what could be considered better cereals that are not covered with sugar, why are most ads on children's television the most highly sugared cereals? The answer is: "It is product diversity, everybody else is doing it, and so are we. We can sell the other cereals to adults, but we can't sell those to children."

Senator McGovern. Did I understand from your statement that you are recommending an absolute prohibition against any kind of television advertising on children's shows?

Mrs. Charren. That is correct.

Mrs. Sarson. That is what we have always been requesting.

Senator McGovern. No advertising at all.

Mrs. Sarson. We could accept one-line statements. "Sesame Street" is aired on 43 stations throughout the United States. "Sesame Street" allows at the end of a program, if a local underwriter underwrites the cost of the program, "This program was brought to you by Smith's Store."

That is the type of thing we would accept on children's programing.

Mrs. Charren. We should point out that we are talking about product advertising. We do not mean, for example, the kind of spots that Miles has made, which we think are very good. That is educational.

Mrs. Sarson. Those are educational. Anything that informs the child in that way is not pushing a product.

Mrs. Charren. You have to remember the way business works. The products sold to children are products that are not good for children. Nobody is trying to sell children lettuce or cheese; Campbell's does not want to spend a lot of money on that advertising for children. It is more effective to advertise that to adults.

You can't have a rule that you shall advertise to children. The only thing you can say is that you cannot advertise——

Senator McGovern. I wonder how you would finance these programs if no advertising were allowed?

Effect of Reducing TV Advertising to Children

Mrs. Sarson. We would have to give you a copy of the study that points out that unlike cigarette advertising—where the ads were taken out overnight, causing a vacuum in the industry—if the amount

of advertising was reduced year by year, over 3 years, there may be a certain amount of pressure. If it was reduced over 10 years, or if you reduce the advertising on children's programs over a 25-year period, you would probably have little effect.

Mrs. CHARREN. Even in a 5-year period they could develop ways to absorb costs in other ways. There is money from all kinds of sources going into children's programing now.

Why is it, for example, that the money from HEW, that went to develop these nutrition spots are being shown solely on "Captain Kangaroo"—which is a moneymaking program. It made, according to an FCC study, $1 million for CBS. Why isn't that available for anybody or any program producer who wants to show it on public or private television?

There is money going in now to programing for children that is not coming from commercial sources. We just say that if programing for children becomes one of the priorities of this country, there could even be less of it, as long as it is better.

Senator McGOVERN. Senator Cook?

Senator COOK. Don't you think that this HEW effort is a pilot study at this time and it will be expanded? I get that impression.

Mrs. CHARREN. I would hope so, but I couldn't understand really why it wasn't the aim to get those spots on as much television as they could.

Senator COOK. I got the feeling that their aim was to find the effectiveness of that particular type of ad. They happened to pick a program that had almost 23 percent of the viewing market with the assumption that this would be a good test market. I would hope that it will be expanded.

Mrs. CHARREN. I am not complaining about the programing, I think it is lovely.

Senator COOK. By the way, I would like to put this article that appeared in Sunday's "Parade Magazine," relative to your organization, in the record,[1] if I could, please.

I think what becomes very apparent in the analysis of the study that was made is that we have a situation where the advertiser really is in direct conflict with the adult in this field.

Mrs. CHARREN. That is correct.

PRODUCTS OF ADVERTISING AGENCIES

Senator COOK. And it is aimed at kind of an intellectual moron, Baron Von Redberry, and Sir Grapefellow. I wonder if we were still on radio, whether they could sell these things. The answer would probably be they couldn't sell them. What is interesting to me is that this particular type of product is not only the product of a manufacturer, but also is the product of the advertising agency in terms of the product names and packaging. Mr. Choate will testify later. At a hearing of the Consumer Subcommittee, Mr. Choate pointed out that advertisers pretest children by use of laboratories and that they are not taking a chance in the marketplace on these products because they know how the products will be received.

When they start to slow down a little bit, then we parents are plagued by another approach, and that is when you can't sell enough

[1] See Appendix, p. 445.

zippy automobiles you put them in the box and you have to buy the cereal to get what is in the box.

The gasoline companies. They are doing a remarkable job with this technique. They are now selling gasoline to our children, not to me, because you have to go to the station so you can get your two little automobiles or something else, and so on.

Apparently, we now are seeing the effects of the toy companies who overproduce and decide the next best way to get rid of them is to sell to children within the normal hours they watch TV.

The National Football League does a pretty good job of that, also.

So I am inclined to feel that the media didn't do us a very good favor when they decided to limit advertising in children's programming to 12 minutes out of the hour, when it used to be as high as 18 minutes.

Regarding the cereals themselves, Dr. Mayer said, yesterday, that if a cereal is as much as 50-percent sugar, then we should classify it as candy. I think that would be a very good idea.

TV Sell . . . Good or Bad

Mrs. Sarson. You touched on a key issue when you talked about the products being designed for marketing, which is what happens.

We asked one company, "Why do you design them this way?" We feel it is important to talk to these people—and we have talked to them—we asked why they design them like this. They said, "Our marketing department tells us they would sell."

This whole concept of creating food to sell instead of creating food that was valuable or worth buying has somehow disappeared. If it will sell on television, it will be a profitable product, whether it is good or bad.

Mrs. Charren. There is something else you picked up and which I think is excellent, that is, if we don't stop it, it will get worse. They realize they can sell anything to children. When you can sell gasoline to children without a car, it is a short step to many other things.

There are a series of ads that are appearing for Father's Day. Most parents would prefer their child to make them something rather than to go out and buy something. And these things are expensive, too.

Mrs. Sarson. The preschool child watching the "Romper Room" program could get a free cardboard car for children if they take their parents to an automobile dealer in the area.

Senator Cook. I think the significance and sophistication of advertising with sound and sight are really just beginning to really develop. I think what it can introduce in the future is quite phenomenal. I think one of the things that bothers me is the Government's role in it.

I am concerned not so much about a prohibition of this particular type of thing on a nutritional basis, but I get concerned about our Government regulations of this type as it relates to a form of a censorship, which does bother me tremendously. I can tell you in all fairness that I evaluate my own children. I have a son who is 10, and I can't think of a time within the last 2 years that he said he wanted to buy anything because it was sold on television.

Perhaps, the child is o[illegible] of the advertiser's target by the age of 10.

I would only hope that the advertisers don't take me too seriously, because they will find a way to get to the 10-year-old.

Mrs. CHARREN. If that is true, it is so sad, because all this children's advertising is directed at the 1- to 10-year-olds. It should be possible to ban that. If you can ban advertising to cigarette users—who have the ability to discriminate between something that might kill them and not taking it—it should be easy to eliminate something that is designed to sell to children under 10. That is a very good point to be made, if that is what those ads are doing.

PROTECT ABOVE FTC-DESIGNATED AGE 5 LEVEL

Senator COOK. I read in the materials provided for this hearing that there is a request before the FTC for a protective umbrella for advertisements on age 5 and below. I don't think that is the correct age. I think we ought to go above this age.

Mrs. CHARREN. That is right.

Mrs. SARSON. Especially in low-income families. We are speaking from middle-class, middle-income families. In families of lower income, it is less clear how old the children are when they can cope. I think age 5 is very low.

Senator COOK. That 5-year-old figure came from a study by Dr. Howard submitted to the FTC.

Mrs. SARSON. That is right, they said that.

Senator COOK. We have had the problem of utilization of food stamps, particularly in the Appalachian areas, where we have indicated a tremendous amount of purchases in the candy, snack food, soft drink area to a very high degree.

It is almost one of those things that defies the imagination on how you can correct it. It is something that we have debated and discussed for a long, long time. The purchasing of all of the candies and all of the soft drinks results in a very, very high sugar diet for many of these families.

Mrs. SARSON. It would be very exciting if the creativity that went into these products went into making apples tempting to children—it would be great. I think the educational and informational promotions are done on low budgets, with less creativity, so they come out looking a little turgid in contrast to the zip and zap of these other things.

Mrs. CHARREN. That is not true of these Miles spots, however.

WHY . . . SUBVERT THEMSELVES IN THIS FIELD?

Senator COOK. If in the advertising business, they really believed they could sell you anything, and they do, why can't they sell you something that is good? Why do they have to subvert themselves in this particular field? Why, for instance, when we do produce good products? All of these companies produce good products. Why don't they do as good a job advertising those products to the young people of the United States as they do with Sir Grapefellow and a Baron Von Redberry. This bothers me.

Mrs. CHARREN. I would like to mention that when ACT says no advertising of these children's products on children's television, we don't mean no advertising on the rest of television. We feel if they take these same products and sell them on adult programs, at least there is a chance that it is the adult that will make the decision to buy or not to buy and the child won't see a goodly number of them.

Senator COOK. I want you to be just as concerned with what comes on after they finish with these advertisements. Some of the things that come on see to it that children can't sleep at night, and that they are afraid to go to bed.

Many people leave lights on all night. One reason that they have to leave the lights on is because of the things children watch on television. Maybe we wouldn't have this energy crisis if there was more thoughtful TV programing.

Mrs. SARSON. That is the most beautiful argument I have heard on that yet. That is gorgeous.

Senator COOK. Thank you.

Senator SCHWEIKER. I was very interested in your testimony where you quoted an assistant general advertising manager:

> When you sell a woman on a product and she goes into the store and finds your brand isn't in stock, she will probably forget about it. But when you sell a kid on your product, if he can't get it, he will throw himself on the floor, stamp his feet and cry. You can't get a reaction like that out of an adult.

It was only last Sunday I was taking my children down to the drugstore and I went for a very specific purpose. Before we left the store, my 3-year-old wanted a certain brand of toothpaste. I didn't even go for toothpaste. We didn't need it. The brand wasn't even in the store at the time. The child really had a temper tantrum, so I couldn't agree with that point more because I just saw it last Sunday.

Senator COOK. Thank goodness it was toothpaste.

TV ADVERTISING IS POWERFUL TOOL

Senator SCHWEIKER. Thank goodness it was the 3-year-old and not all the other four. I think this very graphically demonstrates the point. This is a powerful, potent tool. My 3-year-old, who knows nothing about toothpaste except you brush your teeth with it, but by referring to a brand name, you really have a potent person hooked there. I think this was a very valuable point about the children. When you see the point this way, you can't argue or discuss the situation with a child of that age in any meaningful way. You just have a temper tantrum.

I also like your followup point about the climate that you set, which is very true. There is no question that when a mother or father takes a strong "no" position, you build a hostile relationship with your children. At some point, a parent weakens a little and figures, "Well, you don't want a totally hostile environment," and you give in at some point.

I think this is a psychological fact of life, in terms of parent-child relationship.

One thing I am not quite sold on is not differentiating between kinds of advertising.

Now, I have been through the Christmas buying season with my children and the ads for Christmas toys. But are these ads really having the harmful effects, say, of advertising a sugar-coated cereal and nutrition habits. Why put everything in the same category? Why not differentiate in terms of sugar and nutrition and teeth—very logical things. Why go the whole way?

Separate Problems—Nutrition and Toys

Mrs. Charren. They were really separate problems involved in the two types of advertising. That is why we have separate petitions at the FTC. The food advertising problem is what we have just outlined.

The toy advertising relates very much to the idea that, besides the normal problem of selling to young children, there is a problem that most of the toys sold on TV are overpriced, very expensive toys compared to toys that are not sold over TV. Even the industry—we get this out of "Playthings Magazine," and out of "Toys," the industry magazine—the fact these are the most poorly designed toys sold to children. That the industry, itself, complains they come back in droves after Christmas and it is ruining the industry. It is not fair to entice children to buy, using very attractive advertising—in spite of the fact that the NAB feels they have all these new rules in this area—but it is not fair to entice the children to buy the fashion doll that was so popular and had so many ads before Christmas. If you bought what was shown in a 60-second commercial—which I did buy, going through discount houses in the Boston area until I finally collected everything in the commercial—it was in no box that I expected. It cost $32.64 for the toys in one 60-second commercial. That is a tremendous bite out of a lot of families' toy budget.

That type of thing, the price is not fair. Also what this $32 bought was nothing like the toys the 60-second commercial would indicate.

Mrs. Sarson. There is another point—which is the basic issue we have become concerned with—which is: Is it morally ethical to sell to 3-year-olds. The idea of pitting the research establishment and agency and everything against th ildren, to persuade the 3-year-old to buy a product is really unbelievable.

Given the system of broadcasting as we have it, surely there should be some area where we agree where perhaps we think it is not right to sell to children.

If we feel it isn't right to sell to them, then we really shouldn't be selling anything to them on their own programs. If they see commercials at other times of day, we feel the parent has to cope with that type of thing. But, we feel on a program which is labeled "This program is for children," "Captain Kangaroo"—as many of the late afternoon cartoon programs are—those should be considered sacred ground in that they know young children are watching and the advertisers shouldn't have access to them the way they do now.

Mockups Used—Not Production Models

Senator Cook. Let me add one thing. I try, at least in my own mind, to be quite a free enterprise individual, and I think that I have a very sound basis for it. But to add to your comment about toys on television, many toy manufacturers absolutely cheat the public. They will use their mockup model that may have cost $10,000 to build and that is the one they use on television to advertise. That is the one they use that walks across the stage or that is the one they use that works as a derrick or something else. When you buy the one that is made out of plastic, with string, and it takes four batteries, it is a different matter. It doesn't work the same, it doesn't do the same things, it certainly doesn't last as long, by the way.

I think this is a very deceptive type of advertising. The ads that are shown on television use very sophisticated models that they have taken to the toy show and they spent a lot of money to build. They are not built out of the things that they will tool up and make 25,000 of them every day, put them in a box, and ship them all over the United States. There is a big difference.

I think that the manufacturer ought to know that we know this practice is going on. It is kind of ridiculous that he thinks this is the way he will market his product.

Mrs. CHARREN. What is interesting is the way the ads are designed. They are designed so that the children in the commercial are a little bit older because they find that those are the children that the young children pay attention to. There is no effort made to let anybody know that this really isn't right for that 5-year-old, whereas, it might be fine for a 10-year-old. So the ad is designed to appeal to the largest segments of that 2- to 11-year-old audience because that helps the sales.

There is no effort made to let the child for whom the thing is not right know that it is not right. In fact, it is just the reverse.

It is to entice the child, who wants to be older and therefore, if older kids play with this toy, you will want it, too.

They wouldn't show a lot of ads with 3-year-olds or 5-year-olds playing with it because the 7-year-olds would never want the toys.

Mrs. SARSON. We have a letter from a parent on how she bought a train set for her 4-year-old daughter; that is, it looked on the ad to be that. It turned out to be a complicated set of trains that the woman's engineer husband couldn't put together.

We have a survival kit that we have distributed to parents very successfully and which we will reprint.

On your comment about mockups, one of our favorites is the one that says that batteries are not included, but it says it in print which the kids under 8 or 7 probably can't read.

Senator SCHWEIKER. I can understand your group opposing all children's advertising. The only point I want to make is that I think some of the more serious and detrimental advertising campaigns, in terms of a child's physical health and well-being should be singled out. For example, yesterday Dr. Mayer testified [1] to something I found interesting. He referred to some research or suspicion and scientific thinking tying the overabundant use of sugar in our society to diabetes. I was shocked to find out that one out of five persons either have diabetes or will have the inherited characteristics of diabetes. Now, this, in itself, is an alarming statistic. Diabetes is the second leading cause of blindness in the United States, and it will soon be first.

HOOKING OUR CHILDREN—DISASTROUS EFFECTS

If there is a relationship between sugar and this growing impact of diabetes in our society—this is one of the studies that suggests it—then we may very well be hooking our children on a very serious health binge that will, as you say, disastrously affect them for the rest of their lives, because diabetes affects the heart, kidneys, and almost every organ of our bodies.

[1] See part NE3, pp. 257-261

So my only point here is that if relationships like this are true—and right now it is scientific conjecture—then it seems to me that this is a top priority health matter or matter of physical and healthful longevity of life that I think would have a higher priority as opposed to toys.

Mrs. CHARREN. Senator, we agree with you and that is why we came today to testify when you asked us. That is why we are filing this afternoon—actually with the FTC—an additional filing to our food petition. This will be the second food petition we have presented to the Commission because we did additional research and found the additional sugar problems related to the diet and health of children. That is why we took these eight products and specifically singled them out for complaints—hoping that if it is too complicated for the Federal Trade Commission to act immediately on a trade regulation rule, they can rule on these specific ads and then, through the rules on these ads, will rule on more specific ads. In that way we can possibly eliminate the sugar advertising to children.

SUGAR NOW MAJOR FOOD INGREDIENT

Senator SCHWEIKER. I think singling them out the way you have is very important. I think it is a fact that we should really take into account now—in view of this new medical theory that is unfolding—about the impact of these things. Also we should recognize that sugar used to be a supplement—a seasoning—and now it has become, unfortunately, a staple product, a major ingredient. As a result, we consume, I think, twice the average amount of sugar in the world. It may well account for some of the facts that Americans, diseasewise, are not too well off—compared to some of the other countries around the world.

I am not saying that is always true. I am only offering the conjecture that there is obviously some reason we are in this situation. This is one thing that may lead to it.

Mrs. SARSON. In informing the public of this information, that would be very helpful.

Recently when we began doing research into this, we had two people investigating the types of foods being advertised to children. We were amazed that almost all of them have high-sugar content. Generally, the public is not aware of this. At the end of the ad, it doesn't say that this product has so much sugar and may be detrimental to your teeth, or something like that. It may be difficult for the parent to explain that this may do this or that to you, and to have to continue to say "no" is very difficult.

Mrs. CHARREN. And all this advertising is really in a sense like getting the child hooked on the need to have sugar in your mouth. If you eat enough sugared food—I see this in children, in my own to be exact—you want it to taste like that, so you have more sugared food that tastes like that.

Senator SCHWEIKER. Bringing us up to the next point, you referred to the learning process in terms of eating.

I wonder if you could cite any specific study, or elaborate further on the conditioned response part of the eating habit that obviously would be a very key factor?

Mrs. SARSON. We would have to go and look things up, but the most interesting response came from my own child's school—where the school nurse and my son's class sent home a note that the children were not to bring any more snacks in the school. Because the snacks they were bringing in were all sugar foods, the school felt they were not healthy. From now on the school would provide peanuts as an experiment to see what would happen when they don't eat the sugared foods.

For the past 3 months, because of this, they have stopped all sugared snacks coming to the school; and they have given the children peanuts. The nurse was disturbed beyond measure with the type of foods that were brought in—they were all television-advertised foods.

I am following through with her to see what else they will do in the school, to see what happens.

This is one immediate and very positive reaction to the type of television advertising that has been going on for children.

Mrs. CHARREN. Also because they are snacks, it is the kind of food you keep eating; it is different from the type of food you would serve for dinner.

Senator SCHWEIKER. Thank you.

Senator COOK. Thank you very much.

I think our next two witnesses are Robert Choate and Tracy Westen.

INDUSTRY'S DECISION . . . WILL NOT ENHANCE REPUTATION

May I say for the record, while Mr. Choate and Mr. Westen come up, that this Senator is very disappointed to read in this morning's paper that the representatives from industry have seen fit not to want to appear before this hearing. For their representatives who may be here, let me just say that it is disappointing to me. I think that it is now a matter of selling one's products to us as well as they sell it to 3- and 4-year olds.

But more important than that, the thing that bothers me is that I am afraid that many substantially fine, reputable organizations throughout the United States—by reason of this type of advertising, and by reason of being sold on what their marketing departments and advertising agencies are selling—are suffering from this. I think this is unfortunate.

I find it unbelievable that they would not want to come before this committee and that they would not want to state their case.

I have a feeling that rather than product creativity, that it is marketing creativity, and it is advertising creativity, that is bringing many of these products onto the market. I am not quite sure that the reputations of these companies, in the long run, will be enhanced by it.

STATEMENT OF ROBERT B. CHOATE, JR., CHAIRMAN, COUNCIL ON CHILDREN, MEDIA AND MERCHANDISING, WASHINGTON, D.C.

Mr. CHOATE. I am Robert Choate, chairman of the Council on Children, Media and Merchandising.

I would like to read from the transcript, which we will have in your hands within 5 minutes. We had to take care of some emergency situations that arose in splicing together a film with another that is not compatible.

Over the last 5 years, I have diplomatically, factually, and persistently tried to draw the attention of the Grocery Manufacturers of America to their public responsibilities as they market newer and newer types of puffed, twisted, and scented products.

I have pointed out that they have unusual responsibilities when it comes to children.

Of the 40 cereals that I criticized in 1970, 36 have now been so reformulated as to, in effect, be a different quality product. This must be interpreted that someone in the GMA listens.

But in three regards, the members of the GMA have been particularly immovable:

1. They are not interested in protecting or improving the protein worth of grain products, as far as I can see;
2. They are not interested in educational advertising; and
3. They are absolutely convinced that, for the prepuberty set, sugar appeal is the counterpart of sex appeal.

Since 1969, I have repeatedly beseeched sponsors, advertising agencies and their trade organizations to correct their advertising of food products to children.

My contacts with food manufacturers have been endless. I have also appeared with some regularity before broadcaster groups. It may interest you to know that I believe I am the only consumer advocate who has appeared before the National Association of Broadcasters Code Authority in the 12 years of its existence.

Suggest Code for Advertising Edibles

On May 26, 1971, I suggested a code for advertising edibles—a code which the NAB Code Authority ultimately chose to ignore. Yet, they acknowledge the wisdom of having a toy-advertising code.

I point this out to you to show the extent of the effort we have made to persuade the private sector of our economy to practice self-regulation, self-moderation, and self-policing. I don't know what more one can do.

We have been forced to spend substantial amounts of time trying to persuade the Federal Government to influence those who will not influence themselves on food matters.

Senator Cook, I would speak to the fact right now that having tried the private route through the GMA, and the NAB, we then have gone to the Federal Trade Commission to see what assistance that agency can give us. The Federal Trade Commission does have in development right now guidelines for the advertising of edible products.

I think this is a healthier way for them to act than to act after the fact, when somebody has violated some ethic in the selling of foods. I hope the new chairman, when he comes up to you at your invitation, will reemphasize the desirability of having the FTC come out with some guidelines for the ethical advertising of foods, particularly to children.

During the years after World War II, our food supply was dramatically changed in form, texture, and in "mouth feel," as well as in nutritional content. Sugar came into the recipes for almost everything, including drinks, both frozen and canned; vegetables and fruits, both frozen and canned; catsup, sausages, and even corned beef hash.

The cereal industry started to produce a line of breakfast condiments with sugar contents ranging from 40 to 48 percent. Dr. Mayer says over 50 percent. I wonder if they are adequately analyzed?

The nutrition-related professionals remained silent and apathetic in the 1950's and 1960's. Since most of the good jobs were held in the food industry and most of the grant research money came from the food industry, it apparently was in the best self-interest of the food technicians to hear no evil, see no evil, and think no evil about the manufacturers of "Tastey-Wastey Flakes."

Nutritionists, dieticians, home economists, and dental professionals must have known that the food supply was changing away from anything that could be properly described as the four "food groups."

Very few professional voices could be heard questioning the use of coloring agents, additives, imitation products, or sugar—as these came to be more and more popular ingredients in food.

With Dr. Jean Mayer's leadership in 1969, and the leadership of a few other nutritionists since that time, the silence of the food technicians has turned from a peep to a whisper.

I should state that during this period the 800—I repeat—800-odd public relations people in the Department of Agriculture rivaled television as being the loudest voice in food advice, but few words were uttered on the implications of heavy sugar consumption.

Massive Barrage of Sugar Advertising

Senator Cook, you will remember when I testified February 27 before the Senate Commerce Committee, I pointed out that the commercial message addressed to children has zoomed in frequency in recent years. Today, a moderate television watching child sees 25,000 commercials a year. Between 5,000 to 10,000 of these commercials are for edible products. A child spends over 1,000 hours a year watching television—more time, in fact, than he spends before his elementary school teacher. A moderate television watching child sees 220 minutes of pure commercials each week over television—220 minutes. The impact of this massive propaganda has gone unstudied by academia, foundation, and Government alike, and to a degree, by journalists I testified on the secret research behind children's advertising.

I would like to enter into the record a copy of an advertisement sent by the publisher of the Reader's Digest to, I believe, every Congressman and Senator on Capitol Hill. The letter by the publisher of the Reader's Digest said:

> Unfortunately, the comment on sugar has created an explosion of headlines in an atmosphere where a reasonable presentation of all aspects of the issue is impossible. As a result, the consumer, bombarded with a mass of conflicting information, becomes confused and skeptical. One of those criticized has chosen to use its advertising space to tell the consumer of the place sugar has in our everyday diet. They believe their message is a meaningful, objective judgment on this vital health and nutrition issue.

The publisher of the Reader's Digest invites the Congressmen and Senators to read the advertisement of the Sugar Association. We query the purpose of a major publisher in writing such a letter.

I would like to enter that in the record, if I may.

Senator Cook. Without objection, it will be entered.[1]

[1] See Appendix, p. 421.

Mr. CHOATE. We have pointed out this massive barrage of sugar advertising to the Food and Drug Administration, the Federal Trade Commission, and the Federal Communications Commission.

Each of these agencies has taken note and done very little. Yes; we finally persuaded the Federal Trade Commission to establish guidelines for food advertising, since neither the NAB nor the GMA would do it.

Yes; we have apparently persuaded the Food and Drug Administration to hold a seminar on sugar in our food supply.

Yes; we have participated in the FCC hearings on children's television and have pointed out the en masse advertising responsibilities that reside with the FCC while individual ad deceits remain the responsibility of the Federal Trade Commission.

Still, we cannot be proud of our accomplishments. Yesterday you heard some of the reasons why the food companies would not appear. Let me comment on those reactions by the food industry.

These hearings, as I recall, were called to permit the food industry to show how they are educating children in matters of health and nutrition.

CONSIDERATION OF STUDIES ON DENTAL HEALTH

When the companies heard that dental health was to be considered, they seem to have backed out. Maybe it is well they should, for over an 8-year period, General Foods, Kellogg, and others have been financing studies to halt the epidemic of cavities that they themselves have been bringing to the young population's mouths.

The control groups for these studies at Ann Arbor, Mich., and Elkhart, Ind., have demonstrated the high cariogenic rates of these products.

I think it is time to stop the hypocrisy. A firm such as General Mills spends a few dollars printing a booklet for mothers entitled "Meal Planning for Young Children." Here is what it says:

> Watch the teeth. Use sparingly foods high in sugar. They take away the appetite for more basic foods, provide only calories and quick energy and encourage tooth decay. No coaxing is necessary to get children to eat candy, cookies, cake, or drink carbonated beverages. Teaching a preference for other types of foods must begin early in the high-chair stage. Offer sweets only at the end of the meal.

So advises General Mills in their booklet to mothers.

This same General Mills, on the other hand, spends millions in advertising to children and here is what one of their ads says:

> Mirror, mirror on the wall, whose cereal is the supersweetest of them all? Is it my Count Chocula? My supersweet cereal, chocolate sweet is for monster chocolate flavor.

I think it is time that we got past the nickel and dime morality that is shown by the General Mills pamphlet to mothers and started to look at the tidal wave of beseechments to children to demand sweetness in every meal.

I think it is time we asked for a public service announcement to correct the misinformation that is going out in commercials today.

I think it is time we require sponsors to prepare really good commercials with an educational message.

Now, I would like to show you this morning some messages that have been prepared around the United States, showing what imaginative people are doing and thinking toward nutrition education.

These are not perfect messages. Some of them have been prepared for as little as $500 a minute, compared to maybe $25,000 or $35,000 a minute for a good commercial done for prime time.

But I would like to show you these messages and I will talk about them as we go. In the interest of time, we want to go through in a hurry, run it on through, and I will talk over them, if I can.

Mass Media Experimentation

Food selling to children over the air is still a national disgrace. For this reason, we decided to go into the business of communicating to children directly. We sought out those in the United States who were knowledgeable about food matters and were willing to involve themselves in a mass media experiment.

We found to our delight that some organizations were preparing nutrition-related messages for television aimed at the child and adult alike; these could have a beneficial effect on a child's attitude toward food.

I would like to show you some of the early versions of these. One was financed by a group in Albuquerque, using OEO funds. Another one was a commercial spot done by DuPont to stress their soybean research. Also "Cal Calcium" by the U.S. Department of Agriculture.

[Film presentation.]

This is an early one done by the Department of Agriculture.

These films had reasonably straightforward messages. They may not have had great excitement in their style, but they would certainly help a person who had little knowledge of his food supply. They were less dull than the usual Department of Agriculture home economist message.

In 1971, we noticed that a very few food firms were starting to pay attention to nutritional quality.

[Film presentation: "Nutrients"—Albuquerque; "Soy Bean"—DuPont.]

This is a DuPont commercial which addresses the soybean genetically. In a minute you will see it approaching the wheat seed and, in effect, DuPont is saying that it can do for the wheat seed what it has done for the soy seed.

I include that one to show what can be done with cartoon work in the selling of information about foods.

[Film presentation: "Orange Juice"—Sealed Sweet.]

The fresh orange juice producers seem to take the lead talking about nutrients in orange juice.

[Film presentation: "Alpo Chopped Beef"—ALPO.]

Dog food manufacturers started to talk about the nutrients in their products.

[Film presentation: "School Lunch"—Albuquerque Nutrition Improvement program.]

The then rapidly building national effort to feed better foods to the less privileged brought about an Albuquerque effort with the Lieutenant Governor of New Mexico participating in a public service announcement in behalf of food stamps.

Senator McGovern, we are showing some examples from around the United States of 30- and 60-second spots that have been prepared for television.

Are we ready to roll?

If we are, let's go on with a few more.

These were prepared by foundations, universities and other organizations.

[Film presentations.]

Some of the private groups are starting to use new methods. A little bit of humor goes a long way in this area.

That is a commercial that was filmed and is even on the air this morning on television. Apparently, in that one, we are willing to sell nutrition to our pets but not to our people.

This is a film that appeared through HEW financing; it was developed to be shown on the Captain Kangaroo program. This was prepared by the Robert Southerland Associates in Los Angeles, under a contract with HEW.

As consumers noticed industry's preoccupation with sugar, sugar warning messages started to come forth.

American Dental Association Warns About Sucrose

It is noteworthy that the American Dental Association was aware of the issue, but its messages were subtle and mild.

The ADA had passed a warning resolution relating to sugar and sucrose in the 1950's and early 1960's, but had done little to change the vigor of their posture since that date.

I am delighted to notice that Dr. Nizel, an obvious leader in the field of dental research, has now started to change the ADA's laggard position in this regard.

[Film presentation: "Sugar Warning"—San Francisco KPIX-TV.]

These were done by San Francisco students. These are being shown on the air in the San Francisco area. Group W Broadcasting has been very cooperative in messages such as this across the country.

[Film presentation: "Sugar/snack Warning"—Yellowball Workshop.]

Yellowball was financed by Group W; it is a private Massachusetts organization. This is their commercial.

[Film presentation: "Little Jack Horner"—American Dental Association.]

This was prepared by the American Dental Association; it is one of their shorts that refer to the sugar problem.

The American Dental Association has not been in the forefront of drawing children's attention to the effect of sugar on their teeth. This is what we could find in their library.

I think now we get to the three public service announcements that were prepared by my office for children's program time.

Negative Advertising Directed at Children

As we looked at the food messages of others, we decided that what was needed for children was verve, humor, and perhaps a little ribald provocation.

Noticing that some children had voted the anticigarette commercials of 1966 and 1967 as being the most memorable ads, we recognized the value of negative thinking when it comes to talking about the goods and the bads in your food supply.

I persuaded a New York foundation to sponsor some right-to-the-point messages to be aired to children on the subject of snacks and sugar in their food supply.

I have been well educated by my dentist; also by Dr. Nizel, Dr. Joseph Muehler, and by others on the role that sugar can play in dental deterioration.

I have visited with the dentists in Elkhart, Ind., who for at least 8 years have been conducting research on possible drugs to be added to the food supply of children—hopefully to negate the heavy sugar concentrations that food manufacturers like to put in their products.

Epidemic of Dental Disease

I remember well Dr. Nizel pointing out to me that there is an epidemic of dental disease in this country. He told me a few years ago that of every 100 inductees into the Army, there were 600 cavities to be filled and 106 teeth to be pulled.

We took all these inputs into consideration as we planned to develop two 30-second and one 60-second public service announcement for commercial television to be shown on children's watching time.

After many false starts and detours, we finally came up with the following messages.

[Film presentations: "Gluttony—On Second Thought" 30 seconds. "Tongue and Tooth—On Second Thought" 60 seconds. "Sugar Family—On Second Thought" 30 seconds.]

"On Second Thought" is sponsored by the Society for Nutrition Education, Consumer Federation of America, National Council of Negro Women, and the Council on Children, Media and Merchandising.

These messages have now been sent out to approximately 70 broadcasters in the United States. Perhaps a dozen have agreed to run them; perhaps two dozen have refused to run them.

"Apathy . . . Preoccupation With Income"

The overwhelming answer from the broadcasters to these public service messages is the answer we have noted in regard to nutrition in 1967–71. Apathy, silence, and preoccupation with income:

When one considers this arrogant disregard of a child's rights;

When one considers the sophistication of the preparation of conventional advertisements to children;

When one considers the 220 minutes of pure advertising that a moderate television-watching child is exposed to each week;

When one considers the unchildlike products advertised to children; then

The accusation of an unfair business practice, or an unfair broadcast practice becomes pertinent and to the point.

Either the airwaves must balance their messages to a child on a product-by-product basis or the airwaves must admit messages which stimulate prudent consumer knowledge in the young mind which industry so avidly woos today.

I have tried to show you what has been developed around the United States by those who are, in general, tired of waiting for industry to correct the message aimed at kids over TV.

These messages are having a very mixed reception by the broadcasting industry.

Tracy Westen, on my right, will speak on why they are having problems, why we are having difficulties getting them on the air.

When you realize a moderate television-watching child sees 220 minutes of pure advertising per week, and that a third or half of them are on food products, I think the modest message that you have seen presented here is only a start of bringing balance to children's advertising.

The last two films I would like to show I found 3 weeks ago. They were developed by a remarkable 63-year-old nutritionist in Missouri.

They are probably the best examples of consumer-nutrition information that I have seen in the United States. They were prepared on a shoestring put up by the Department of Agriculture. This lady is now distributing them in the Missouri, Nebraska, Iowa area and I hope, in her retirement, she goes on and publishes better materials.

[Film presentations.]

Mrs. Lorene Wilson is a member of the extension service of the University of Missouri. Mrs. Wilson is about to retire as a consumer specialist.

She has written the scripts, prepared the food, and acted the parts in some sequences. She is now distributing her films to stations within a 300-mile radius of Columbia, Mo. I think her materials are first rate and show what can be done.

But remember, Senators, before much further effort is expended in this direction, we need to create the opportunity among the broadcasters of the Nation for these materials to reach the air.

Thank you.

Senator McGOVERN. Mr. Westen?

STATEMENT OF TRACY A. WESTEN, DIRECTOR, STERN COMMUNITY LAW FIRM, WASHINGTON, D.C.

Mr. WESTEN. I am Tracy Westen, director of the Stern Community law firm in Washington here, which is a nonprofit public interest law firm.

For the past several years, I have been working with public interest organizations in their attempt to broadcast health, safety, and nutritional messages over radio and television; although we have been concerned with problems of deceptive messages on the air.

I would like to share some of my experiences with you. Many of these efforts have met with frustration, censorship, and neglect by the broadcast media. Based on my experience in negotiating with broadcast stations and in litigation before the Federal Communications Commission, and in the courts, I have reached a tentative but depressing conclusion:

"Assuming that educational groups created nutritional messages of such importance that they might potentially change the eating and living habits of millions of Americans, they probably could not get them on the air or keep them there."

PUBLIC NOT INFORMED

Although television and radio are among the most effective media for communicating health and safety information to the public, consumer groups with health and safety messages have often found the

doors of entry slammed shut in their faces. Their messages are not broadcast; their information is not communicated; and the public is not informed.

There are, of course, exceptions. Some public health and safety messages do appear on television. But too often they are bland and uninformative. Too often they are shown in early morning or late evening hours, seen only by early rising farmers or late sleeping insomniacs.

The general point, therefore, is still valid: many important nutritional messages never reach the television viewing public.

I believe the lack of nutritional communication and information is one of the critical problems facing this committee. We can assume that most people want to be healthy, and that much information to help them is already available. The essential problem is communicating that known information to the American public.

From experiences in distributing messages to the broadcast media, we have learned four basic things.

First, we have learned that nutritional problems are almost always informational or communications problems. A mother in Appalachia can watch television 10 hours a day, for example, and still not learn that feeding her child a protein-deficient diet of potatoes, cereal, and starch may stunt its mental growth.

A teenage girl may spend 10 hours a day plugged into a transistor radio, yet never learn that a sugar and starch-laden diet of cokes, candy, french fries, potato chips, ice cream and pie may rot her teeth, increase her weight, distort her intake of vital nutrients, and subject her in later life to the risks of heart, kidney and blood-sugar diseases.

In each of these cases, the nutritional problems are not medical, scientific or factual. They are communicational.

It is what people don't know that can hurt them, starve them, or undernourish them. Nutritional problems cannot be solved, therefore, unless accurate information is effectively communicated to the American public.

Second, we have learned that effective communication cannot exist without access to the broadcast media.

The polls tell us that over 60 percent of the American public consider television their principal source of news and information.

Nutritional groups can churn out reports, write newspaper articles, and hold press conferences to their hearts' content, but the average television set—according to the latest surveys—is turned on approximately 7 hours a day. Given the time people spend watching television, working, eating, and sleeping, very little time is left for reading.

In fact, the people most in need of nutritional information—children and the poor—are least likely to read, and most likely to spend long hours watching television. If these people are to be educated nutritionally, then they must be reached through television.

The third lesson is the importance of the "commercial" format. The 30- or 60-second commercial is perhaps the most powerful and sophisticated educational tool ever devised.

One 60-Second Commercial Equals Teacher's Career

Few teachers spend as much time or thought in their entire careers as do Madison Avenue agencies, artists, writers, photographers, actors, and directors in producing one 60-second commercial. It is

perhaps for this reason that companies like Coca-Cola, for example—the Nation's 14th largest advertiser—spent over $71 million on advertising in 1971 alone, most of it for radio and television commercials, and most of that for soft drinks containing chemicals, sugar, and carbonated water.

This incredible sum, incidentally, could pay 9,000 teachers a salary of almost $8,000 a year teaching grammar school children basic nutritional information.

Consumer groups have learned, therefore, that advertising techniques can be used as basic educational tools, to educate and inform, as well as sell and promote.

Public Interest Versus Commercial Interests

Although television stations are licensed to operate in the "public interest," their underlying motivation—perhaps not unnaturally—is to operate in the "commercial interest."

Television, fundamentally, is a business.

Although in 1928 the Federal Radio Commission warned that the benefit "derived by advertisers [from broadcasting] must be incidental and entirely secondary to the interest of the public," it publicly admitted failure 37 years later when it concluded: "Network television became largely a sliderule advertising medium principally motivated by a commerical concept."

Because television is a commercially supported medium, it tends to censor, exclude or ignore ideas, arguments or information that might make it less attractive to advertisers and sponsors.

For many years, Procter & Gamble, television's largest advertiser—$190 million in 1971 alone—made this quite explicit in the "editorial policy" it circulated to its television producers. It warned: "There will be no material that may give offense, either directly or by inference, to a commercial organization of any sort."

One NBC programing vice president has been brutally frank: "We have always gone on the theory that the man who pays the bills has a right to some voice in shaping the product."

For television, there is little doubt who pays many of its bills—the manufacturers of cereals, snack foods, candies, chewing gum, cakes, pastries, and soft drinks.

In 1971, for example, the 23 leading food, candy, gum, and soft drink advertisers spent over $700 million on television advertising alone.[1]

Arrayed against this advertising "megatonnage," the efforts of nutritionists to broadcast truthful information about many heavily advertised products seem insignificant indeed.

There are three ways to get nutritional messages on television, and none of them really have been successful:

1. Through programing produced by the television industry:
2. Through nutritional advertisements or spots produced by advertisers; or,
3. Through Public Service Advertisements (PSA) distributed by groups interested in nutrition and broadcast on a "paid" or a "free" basis.

[1] General Foods, General Mills, Kraftco, Nabisco, Ralston Purina, Kellogg, Campbell Soup, Norton Simon Co., McDonald's, Nestle, Quaker Oats, Carnation, CPC International, Pillsbury, Standard Brands, H. J. Heinz, Beatrice Foods, Borden, Wrigley, Mars, Coca-Cola, Pepsi-Cola, Seven-Up.

None of these methods are likely to succeed, however, whenever the underlying message is construed as countering, undermining, opposing or refuting heavily advertised products.

The television industry, for example, is unlikely to produce programing to argue the health hazards of sugar, the absence of nutrition in soft drinks, the tooth decay produced by chewing gums, candies and presugared cereals, the high cholesterol in meats and dairy products, or the nutritional bankruptcy of junky "snack" foods.

One breakfast cereal sponsor reportedly deleted the line, "She eats too much," from a television drama because it felt nobody could ever eat too much. In each case the television producer would fear the loss of powerful sponsors for its programs—or even the loss of entire accounts.[1]

No Profit in Producing Nutritional Messages

The advertising industry is also unlikely to produce and distribute, at its own expense, many important nutritional messages. For one thing, it may not be profitable. As the president of the American Tobacco Co. remarked several years ago: "I don't have the right to spend the stockholders' money just to entertain the public."

More importantly, the messages may undermine the sponsor's own product.

What chewing gum or candy manufacturer would urge children to avoid their products for fear of tooth decay?

What cereal manufacturer would warn that its product contained 48-percent sugar?

What soft drink manufacturer would advise viewers to drink plain water instead of its concoction of chemicals and sugar?

Indeed, what food manufacturer would even urge viewers to eat less. To avoid excessive amounts of carbohydrates; sugars, and fats, to cut down on cholesterol-producing foods; to avoid snack foods; and to buy fresh instead of canned vegetables and foods?

The third method of informing the public—distributing public service advertisements from consumer groups—has encountered similar obstacles. Although television stations often make time available for free public service announcements, for example, "Smokey the Bear," they have consistently refused to offer this time for announcements that might counter or detract from a commercial sponsor's message.

And although television stations sell up to 25 percent of their air time for commercials, they have refused to sell this time for alleged "counter-commercial" messages.

One auto safety example drawn from our experience will illustrate the point. In late 1971, General Motors admitted that a potentially deadly engine-mount defect existed in almost seven million 1965–69 Chevrolets, a defect which could cause the car suddenly to accelerate out of control without power brakes or steering. General Motors recalled the cars, but Chevrolet officials admitted that well over

[1] The Coca-Cola Co. reportedly obtained additions and deletions in an NBC documentary on migrant workers which showed abysmal health and labor conditions on the company's Florida ranches. See F. Feretti, *Coca-Cola Denies Link to Farm Ills*, New York Times, July 6, 1970; R. Walters, *NBC Alters Documentary*, Washington Evening Star, July 17, 1970, p. A-7. Coca-Cola subsequently canceled its entire multimillion dollar advertising account with NBC. See *Coke Goes Better With CBS*, Variety, Jan. 20, 1971, p. 27. Any network would be reluctant to risk the displeasure, much less the loss, of such an enormous food account.

two million unrepaired and potentially lethal cars would remain on the highways.

The nonprofit Center for Auto Safety therefore produced, at its own expense, a public service announcement urging Chevrolet owners to bring their cars in for repairs, and asked the three television networks and at least one local Washington, D.C. station to broadcast it free of charge. Each of them refused.

Stations Refuse To Sell Time For Warnings

The center then asked the local station to sell them the time, at standard commercial rates, to broadcast the same warning announcement. Again the station refused.

The result? Although the networks and stations had made millions of dollars advertising the safety and quality of 1965–69 Chevrolets, they refused to give, or even sell, 30 seconds of airtime for an announcement that might have saved the lives of those Chevrolet owners who relied on the Chevy ads. The reason, I submit, was that they feared the announcement might displease Chevrolet, a major television sponsor.[1]

At the moment, public interest groups wishing to produce and distribute their own nutritional messages have no other recourse.

The Supreme Court is now considering whether the first amendment requires broadcast stations to sell time to any group, regardless of their message. But even if the answer is yes, few consumer groups will be able to afford the $40,000 to $80,000 rate for 1 commercial minute on network evening time.

The only alternative is free public service time, but it is often barred to public interest groups by entrenched television advertisers.

Although our firm has filed test case litigation to establish a limited right for consumers to air free public service messages, a final legal solution is no doubt several years away.

Conclusion

I would conclude, then, with several observations and recommendations:

1. Nutrition must be viewed in part as a communications problem.
2. Information on health and nutrition can be distributed most effectively through the broadcast media, and this often requires the use of a commercial-type format.
3. Given the commercial pressures that operate on the broadcast industry, many important nutritional messages are currently censored by, or withheld from, the American public.

That, unfortunately, is a dismal conclusion, but it is based on my own experience.

[1] The local station, WTOP-TV, a CBS affiliate, explained: "Although not described as such, the announcement has some earmarks of 'counter-advertising,' intended at least in part to affect consumer purchasing decisions. The language and tone of the announcement are such, in our judgment, to make the announcement questionable." Letter to the Center for Auto Safety, from WTOP-TV, June 28, 1972.

In my opinion, remedial legislation is clearly required. I would make three suggestions:

1. Broadcast stations should be required to sell commercial time to any purchaser able to pay the going rate, regardless of the content of his message.

2. Either Congress or the FCC should specify a minimum amount of time that each licensee must devote to free public service announcements produced by others, and they must require licensees to accept these announcements on a fair and even-handed basis, without discrimination against allegedly "counter-commercial" messages.

3. Licensees should be required to inform the FCC at renewal time how much air time they have devoted to matters of public health and safety.

The Commission should be empowered to revoke the license of any station that recklessly disregards its obligation to communicate important health and safety information to the public.

PREPARED STATEMENT OF TRACY A. WESTEN

Nutrition and the Mass Media: A Study in Frustration, Censorship and Neglect

Mr. Chairman, for the past several years I have been working with public interest organizations in their attempt to broadcast health, safety, and nutritional messages over radio and television. Many of these efforts have met with frustration, censorship, and neglect by the broadcast media. Based on my experience in negotiating with broadcast stations and in litigation before the Federal Communications Commission and in the courts, I have reached a tentative but depressing conclusion:

> Assuming that educational groups created nutritional messages of such importance that they might potentially change the eating and living habits of millions of Americans, they probably could not get them on the air or keep them there.

Although television and radio are among the most effective media for communicating health and safety information to the public, consumer groups with health and safety messages have often found the doors of entry slammed shut in their faces. Their messages are not broadcast; their information is not communicated; and the public is not informed.

There are, of course, exceptions to this generalization. Some public health and safety messages do appear on television. But too often they are bland and uninformative. Too often they are shown in early morning or late evening hours, seen only by early-rising farmers or late-sleeping insomniacs. The general point, therefore, is still valid: Many important nutritional messages never reach the television viewing public.

I believe the lack of nutritional communication and information is one of the critical problems facing this committee. We can assume that most people want to be healthy, and that much information to help them is already available. The essential problem is communicating that known information to the American public. Our experiences in distributing messages to the broadcast media, however frustrating, have given us some insights into these problems, and I would like to share four of them with you.

First, we have learned that nutritional problems are almost always informational or communications problems. A mother in Appalachia can watch television 10 hours a day, for example, and still not learn that feeding her child a protein-deficient diet of potatoes, cereal, and starch may stunt its mental growth. A teenage girl may spend 10 hours a day plugged into a transistor radio, yet never learn that a sugar and starch-laden diet of cokes, candy, french fries, potato chips, ice cream, and pie may rot her teeth, increase her weight, distort her intake

of vital nutrients, and subject her in later life to the risks of heart, kidney, and blood-sugar diseases. In each of these cases, the nutritional problems are not medical, scientific or factual. They are communicational. It is what people don't know that can hurt, starve, or undernourish them. Nutritional problems cannot be solved, therefore, unless accurate information is effectively communicated to the American public.

Second, we have learned that effective communication cannot exist without access to the broadcast media. The polls tell us that over 60 percent of the American public considers television its principal source of news and information. Nutritional groups can churn out reports, write newspaper articles, and hold press conferences to their hearts' content. But the average American will never see them. That average American—according to the latest surveys—is spending approximately 7 hours a day watching television. Given time spent working, eating, and sleeping, very little time is left for reading. In fact, the people most in need of nutritional information—children and the poor—are least likely to read and most likely to watch television. If they are to be educated nutritionally, then they must be reached through television.

The third lesson is the importance of the "commercial" short format. The 30- or 60-second commercial is perhaps the most sophisticated and powerful educational tool ever devised. Few teachers spend as much time or thought in their entire careers as do Madison Avenue agencies, artists, writers, photographers, actors, and directors in producing one 60-second commercial. It is for this reason that companies like Coca-Cola—for example—the Nation's 14th largest advertiser—spent over $71 million on advertising in 1971—most of it for radio and television commercials, and most of that for soft drinks containing chemicals, sugar, and carbonated water. (This incredible sum, incidentally, could pay 9,000 teachers a salary of almost $8,000 a year teaching grammar school children basic nutritional information.) Consumer and nutrition groups, therefore, are beginning to learn, along with the producers of "Sesame Street," that advertising techniques can be used as basic educational tools, to educate and inform, as well as sell and promote. Their first attempts to distribute educational messages to the mass media, however, have generated their fourth and perhaps most significant lesson.

Although television stations are licensed to operate in the "public interest," their underlying motivation—perhaps not unnaturally—is to operate in the "commercial interest." Television, fundamentally, is a business. It is run by businessmen; it sells its advertising time for businessmen; it pays its profits to businessmen. Television's basic product is not programing, but the audience it sells to its advertisers—at a "cost per thousand." As FCC Commissioner Nicholas Johnson has observed:

> The most widely prevalent myth about the television business is that it has to do with programing. It does not. Its product is not programing; its product is you. You are not the consumer; the advertiser is the consumer. The advertiser is buying audience, audience to watch his commercial; he buys that audience from the broadcaster (network or local station); you are sold to him like cattle—at a "cost per thousand." You are the product. No one buys the program. The program is the attention-getting device, the flypaper, the flashing neon, the carnival barker, the medicine show, the topless dancer. Once you begin to perceive the television business in this light it is easier to understand the reasons why television programing has been such a social disaster in our country.

Although in 1928 the Federal Radio Commission warned that the benefit "derived by advertisers [from broadcasting] must be incidental and entirely secondary to the interest of the public" (2 F.R.C. Ann. Rpt. 168 [1928]), it publicly admitted failure 37 years later when it concluded:

> [T]he policies and practices of network managers * * * tended to substitute purely commercial considerations based on circulation and "cost per thousand" for considerations of overall service * * *. In other words, network television became largely a "slide rule" advertising medium principally motivated by a commercial concept. (FCC second interim report, "Television Network Program Procurement," Pt. II, at p. 231 [1965]).

Because television is a commercially supported medium, it tends to censor, exclude or ignore ideas, arguments or information that might make it less at-

tractive to advertisers and sponsors. As one advertising vice president explained to the Federal Communications Commission:

> [I]f you have a client who sells bulk soap to laundries, you don't put on a show which shows a laundry carefully tearing buttons off shirts—the laundries don't like it; if you are selling boxed shortening to bakers, you don't put on a show which shows nefarious bakers who poison bread—bakers don't like that. Similarly, if you have an automobile client, you scarcely put on a show in which the oil is shown to be of horrible quality so that machinery grinds to a halt halfway across the Atlantic * * *. I have known all three to happen in my own agency. (Quoted in H. Mehling, "The Great Time-Killer," 58 [1962].)

For many years, Proctor & Gamble, television's largest advertiser ($190 million in 1971 alone), made this quite explicit in the "Editorial Policy" it circulated to its television producers. It warned:

> There will be no material that may give offense, either directly or by inference, to * * * a commercial organization of any sort * * *. For obvious reasons, it is essential that no statements be made on any of our shows which could be construed as being unfavorable to any special group of the company's customers or which would favor one type of customer over another. (Quoted in H. Mehling, "The Great Time-Killer," 62 [1962].)

One NBC programing vice president has been brutally frank:

> [W]e have always gone on the theory that the man who pays the bills has a right to some voice in shaping the product. (H. Mehling, *supra*, at p. 64.)

For television, there is little doubt who pays many of its bills—the manufacturers of cereals, snack foods, candies, chewing gum, cakes, pastries, and soft drinks. In 1971, for example, the 23 leading food, candy, gum, and soft drink advertisers[1] spent over $700 million on television advertising alone. Arrayed against this advertising "megatonnage," the efforts of nutritionists to broadcast truthful information about many heavily advertised products seem insignificant indeed.

There are three ways nutritional messages can reach television: (a) through programing produced by the television industry; (b) through nutritional advertisements or "spots" produced by advertisers; or (c) through "public service advertisements" distributed by groups interested in nutrition and broadcast on a "paid" or a "free" basis. None of these methods are likely to succeed, however, whenever the underlying message is construed as countering, undermining, opposing, or refuting heavily advertised products.

The television industry, for example, is unlikely to produce programing to argue the health hazards of sugar, the absence of nutrition in soft drinks, the tooth decay produced by chewing gums, candies and presugared cereals, the high cholesterol in meats and dairy products, or the nutritional bankruptcy of junky "snack" foods.

(One breakfast cereal sponsor reportedly deleted the line, "She eats too much," from a television drama because it felt nobody could ever eat too much.) In each case the television producer would fear the loss of powerful sponsors for its programs—or even the loss of entire accounts.[2]

The advertising industry is also unlikely to produce and distribute, at its own expense, many important nutritional messages. For one thing, it may not be profitable. As the president of the American Tobacco Co. remarked several years ago:

> Taking 100 percent as the total radio value, we give 90 percent to commercials, to what's said about the product, and we give 10 percent to the show * * * I don't have the right to spend the stockholders'

[1] General Foods, General Mills, Kraftco, Nabisco, Ralston Purina, Kellogg, Campbell Soup, Norton Simon Co., McDonald's, Nestle, Quaker Oats, Carnation, CPC International, Pillsbury, Standard Brands, H. J. Heinz, Beatrice Foods, Borden, Wrigley, Mars, Coca-Cola, PepsiCo, Seven-Up.

[2] The Coca-Cola Co. reportedly obtained additions and deletions in an NBC documentary on migrant workers which showed abysmal health and labor conditions on the company's Florida ranches. See F. Feretti, "Coca-Cola Denies Link to Farm Ills," New York Times, July 6, 1970, R. Walters, "NBC Alters Documentary," Washington Evening Star, July 17, 1970, p. A-7. Coca-Cola subsequently canceled its entire multimillion-dollar advertising account with NBC. See "Coke Goes Better With CBS," Variety, Jan. 20, 1971, p. 27. Any network would be reluctant to risk the displeasure, much less the loss, of such an enormous food account.

money just to entertain the public. (Quoted in H. Mehling, *supra*, at p. 183.)

More importantly, the messages may undermine the sponsor's own product. What chewing gum or candy manufacturer would urge children to avoid their products for fear of tooth decay?[3] What cereal manufacturer would warn that its product contained 48 percent sugar? What soft drink manufacturer would advise viewers to drink plain water instead of its concoction of chemicals and sugar? Indeed, what food manufacturer would even urge viewers to eat less; to avoid excessive amounts of carbohydrates, sugars and fats, to cut down on cholesterol-producing foods; to avoid "snack" foods, and to buy fresh instead of canned vegetables and foods?

The third method—distributing "public service advertisements" from consumer groups—encounters similar obstacles. Although television stations often make time available for free "public service announcements" (e.g., "Smokey the Bear," "Volunteers for America," "Radio Free Europe," et cetera) they have consistently refused to offer this time for announcements that might "counter" or detract from a commercial sponsor's message. And although television stations sell up to 25 percent of their air time for commercials (16 minutes an hour in some children's programing), they have refused to sell this time for allegedly "counter-commercial" messages.

One auto safety example will illustrate the point. In late 1971, General Motors admitted that a potentially deadly engine-mount defect existed in almost 7 million 1965–69 Chevrolets, a defect which could cause the car suddenly to accelerate out of control without power brakes or steering. General Motors recalled the cars, but Chevrolet officials admitted that well over 2 million unrepaired and potentially lethal cars would remain on the highways. The nonprofit Center for Auto Safety therefore produced, at its own expense, a "public service announcement" urging Chevrolet owners to bring their cars in for repairs, and asked the three television networks and at least one local station to broadcast it free of charge. Each of them refused. The Center then asked the local station to sell them the time, at standard commercial rates, to broadcast the same warning announcement. Again the station refused. The result? Although the networks and stations had made millions of dollars advertising the safety and quality of 1965–69 Chevrolets, they refused to give, or even sell, 30 seconds of air time for an announcement that might have saved the lives of those Chevrolet owners who relied on the Chevy ads. The reason, either implicitly or explicitly, was the displeasure the announcement might cause Chevrolet.[4]

At the moment, public interest groups wishing to produce and distribute their own nutritional messages have no other recourse. The Supreme Court is now considering whether the first amendment requires broadcast stations to sell time to any group, regardless of their message. But even if the answer is "yes," few consumer groups will be able to afford the $40,000 to $80,000 rate for 1 commercial minute on network evening time.

Free "public service" time is also available from most stations, but this time is generally barred to messages opposed by entrenched television advertisers. And although our firm has filed test case litigation to establish a limited right for consumers to air free public service messages, a final legal solution is no doubt several years away.

I would conclude, then, with several observations and recommendations. First, nutrition must be viewed in part as a communications problem. Second, information on health and nutrition can be distributed most effectively through the broadcast media and this often requires the use of a "commercial-type" format. Third, given the commercial pressures that operate on the broadcast industry, many important nutritional messages are currently censored by, or withheld from, the broadcast media.

In my opinion, remedial legislation is clearly required. I would make three suggestions. First, broadcast stations should be required to sell commercial time to any purchaser able to pay the going rate, regardless of the content of his message.[5] Second, either Congress or the FCC should specify a minimum amount of

[3] Colman McCarthy has reported that Americans spend more money on candy than on dental care. C. McCarthy, "Oh Sugar!" Washington Post ("Potomac magazine"), Feb. 11, 1973, p. 13.

[4] The local station, WTOP-TV, a CBS affiliate, explained: "Although not described as such, the announcement has some earmarks of 'counter-advertising,' intended at least in part to affect consumer purchasing decisions. The language and tone of the announcement are such, in our judgment, to make the announcement questionable." Letter to the Center for Auto Safety, from WTOP-TV, June 28, 1972.

[5] This issue will be moot if the Supreme Court finds a first amendment right to purchase air time. If it does not, this right could be established by legislation.

time that each licensee must devote to free "public service announcements" produced by others, and they must require licensees to accept these announcements on a fair and evenhanded basis, without discrimination against allegedly "counter-commercial" messages. Third, licensees should be required to inform the FCC at renewal time how much air time they have devoted to matters of public health and safety. The Commission should be empowered to revoke the license of any station that recklessly disregards its obligation to communicate important health and safety information to the public.

Thank you, Mr. Chairman, for the opportunity to present my views. I would be happy to answer any questions the committee might have.

Senator McGovern. Thank you very much.

Mr. Choate, as you know, the broadcasting industry is under much pressure these days dealing with all sorts of problems.

They have, as you pointed out, taken some positive steps regarding the advertising of toys, and in other areas. Is their lack of responsibility to your petition and the efforts of others on the advertising of foods the result of a lack of concern or is it, in your opinion, that they just haven't focused on that problem as yet?

Not a Meaningful Issue

Mr. Choate. I think they have not felt the need to react. I talked with Stockton Helffrich, director of Code Authority, National Association of Broadcasters, after I testified on cereals, and he said the broadcasters said they didn't think it was a meaningful issue.

As I said, 36 of the 40 cereals had been changed, so at least the manufacturers thought it was a meaningful issue.

I think the advertising agencies are way behind the exhibitors in exhibiting social responsibility, and the broadcasters are even further behind the agencies.

I think it is time the sponsors who, after all, control the flow of greenbacks to ad agencies and broadcasters, started to pound into their heads some realization that if the advertising of edibles—particularly to children—isn't cleaned up, that they are going to face regulation, and since it won't be self-regulation, it will be executive branch or congressional regulation. So far they have gotten away with it.

Senator McGovern. Do you have any recommendation at this point for congressional action, or do you think we should wait for a while?

Develop Guidelines for Ethical Advertising of Food

Mr. Choate. I could think nothing you could do more constructively, sir, than to call the new chairman of the Federal Trade Commission and ask him to reiterate what Mi! s Kirkpatrick said when he announced that the FTC would develop guidelines for ethical advertising of foods. If that policy will come forth from the FTC, then those who advertise foods will know in advance where they risk falling into the FTC clutches; then I would think we would see more ethical advertisements of food.

Certainly, the petition of ACT should be made a part of that. Certainly the advertising of foods today is the advertising of cavities.

Senator McGovern. You probably heard Dr. Mayer say yesterday

that the ability of producers of basic wholesome commodities— such as vegetables and fruits, and some of the things we saw on your film here—is very difficult for people selling products of that kind to compete in the advertising market with the corporations that are advertising snack foods of various kinds—because they don't have the budget, of course.

How can that situation be balanced? What can be done to try to give greater advertising strength to these wholesome products?

Mr. CHOATE. Richard Manhoff, head of an advertising agency in New York City, a man very much interested in nutrition, has called for the setting aside of 20 percent of broadcast time for public service type messages and programs. I think it is time that the Congress took a look at the commercialism of the airwaves now and started to ask for some moderation and some sharing of public information over those same airwaves.

I do think that the producers of potatoes and peanuts and cherries and apples do have a point. They are very fragmented.

There are no IBMs or General Motors in that portion of the food industry. They do have very powerful trade organizations. I do think that the broadcaster really has to accept the responsibility.

He may not have invented the misinformation that is currently carried to children, but he is certainly at the confluence point where a variety of self-serving messages end up on the air and thus mislead children in nutritional wisdom.

I think the broadcaster has to grant public service time for in effect airing of the benefits of the fruits and vegetables, so they can come into a parity position with some of the more prepared and coaxed and teased foods that today are advertised so heavily.

Mr. WESTEN. Could I add one thing to that question?

Senator MCGOVERN. Certainly.

FREE TV TIME FOR CONSUMER GROUPS

Mr. WESTEN. In order to reach millions of American homes on television it may cost $50,000 or $60,000 or $70,000 merely to buy a minute of time.

If consumer groups have important messages that have to be put up, these figures are out of their reach. It means some free time must be made available, and it must be made available on a nondiscriminatory basis. It can't be made available only if you don't have anything controversial to say.

Second, if free time is available, television production costs a lot of money. Most consumer groups don't have the money even to produce good television programing.

What can be done about that?

Well, to use an example, most States are imposing a gasoline tax in order to pay for their highways. To use that analogy, we could tax advertising to pay for the use of the airwaves. That tax revenue could be used to fund messages—counterbalancing messages on nutritional and other public interest issues.

Senator MCGOVERN. Well, thank you very much, Mr. Westen, and Mr. Choate.

I wish we had more time—Bob?

Mr. CHOATE. Mr. Chairman, I would like to invite the committee to note in its written transcript the testimony that I gave last Tuesday before the Senate Commerce Committee, the subcommittee headed by Senator Moss, at a hearing in New York.

It is so relevant to today's and yesterday's subject matter that I would hope people looking at this record would look back at what was said there and vice versa. I would hope there would be some cross-referencing.

Senator MCGOVERN. In view of the fact we are running out of time, we would say we would check that testimony, but if we may, the committee would like to submit possible additional questions to you, Mr. Choate, and you, Mr. Westen, so we can enlarge on these matters.

I regret we are running out of time. It would be interesting to broach this interrogation further.

I want to take advantage of this situation, Mr. Choate, to express my continuing appreciation for the long years and persistent effort you have made in this whole nutritional field.

I think it is quite possible this committee never would have been born had it not been for your efforts several years ago, and we are very grateful that you are keeping up your efforts.

Mr. CHOATE. Thank you, sir.

Senator MCGOVERN. Our thanks also to you, Mr. Westen, for appearing today.

We have one additional panel of witnesses: Mr. George Orr, Mr. Johnson, and Mr. Semple. They are presenting a statement by Mr. Walter Ames Compton, M.D., president and chief executive officer of Miles Laboratories.

STATEMENT OF GEORGE W. ORR, JR., EXECUTIVE VICE PRESIDENT; ACCOMPANIED BY DANIEL R. JOHNSON, ASSOCIATE COUNSEL: AND BRUCE SEMPLE, M.D., VICE PRESIDENT, MEDICAL AFFAIRS, CONSUMER PRODUCTS GROUP, MILES LABORATORIES, INC.

Senator MCGOVERN. Gentlemen, we apologize for keeping you so late into the lunch hour but maybe you can hit the highlights of your statement and we will appreciate it and be glad to see the film that you have. We will make sure your entire statement is part of the hearing record in any event.

Mr. ORR. I am George W. Orr, executive vice president of Miles Laboratories.

I am pleased to appear before this committee to read the statement of our president, Dr. Walter Ames Compton, who was unfortunately unable to appear due to a long standing and urgent commitment outside the United States.

I am accompanied by Dr. Bruce Semple, chief medical officer of our Nutrition and Hygiene Division, and Mr. Daniel Johnson, associate counsel of Miles.

We are appreciative of this opportunity to present to this committee our views regarding the need for improved nutritional knowledge by the American people, and certain nutrition education activities which we have undertaken in order to help meet this need. This statement will outline our past interest and efforts in this regard, and will describe the current status of a program of activities we have developed toward this end.

In this regard we will present to you some films we have developed as one effort in the particular area of nutritional education for children, part of a long-term commitment covering many aspects of nutrition education, which we view as an especially important objective in bringing about improvement in nutritional knowledge and the nutrition of the American people.

There are clear indications of increasing recognition that the nutritional status of many Americans is considerably less than optimum, and that betterment of nutritional status, based in part on greater public awareness of the components of good nutrition, can be achieved through combined efforts of industry and Government. Statements of nutritional experts and others concerned about good nutrition appearing in the media, symposia, and in hearings such as those conducted by this committee evidence this to be the case. Such concern is a healthy first step in bringing about improvements in nutrition. The considerable efforts of this committee in bringing into focus the fact of nutritional need in this country merit special commendation.

Representatives of Miles Laboratories have had the privilege of appearing before this committee on two previous occasions. In these earlier appearances in February and December of 1971, information was presented regarding the nutritional status of the American population, the need for improved nutrition education, and the development and availability of products designed to improve specific aspects of nutrition, particularly with respect to the economically disadvantaged.

Malnutrition Problem in our Society

That there is a problem of malnutrition in our society there should be no doubt; a problem of serious consequences to our Nation—malnutrition of both deficiency and abundance. It has shocked many to learn that nutrition deficiency—both lack of food and lack of specific nutrients—exists in this country. Yet, the National Nutrition Survey, and the findings of this committee, among others, have documented the existence of this problem. In the past, there has been a complacent feeling about nutrition in this country, based on the misconception that the so-called "average" American diet will automatically take care of all nutritional problems. With more freedom of food choice than in any other country, Americans as a whole poorly understand, and much less conform to, the rules of good nutrition; taste rather than nutritive value becomes the predominant factor in food selection.

Deficiencies of Vitamins and Minerals

Vitamin and mineral deficiencies are an excellent example of this phenomenon. As we have testified previously before this committee, there is widespread incidence of dietary deficiency of one or more vitamins and iron, both among the financially underprivileged and those who possess more adequate resources. Obtaining from table foods adequate amounts of vitamins requires careful and intelligent selection and consumption of foods. Even for those with sufficient resources to obtain food without economic restraint, until all are

educated as to the necessity for proper selection and consumption of a varied diet—and are willing to select their food in accordance with such knowledge—these problems will continue to exist. Thus, knowledge of basic nutrition facts must be improved. This should be regarded as especially important in the case of children, for whom an understanding of basic nutrition will foster better dietary patterns in later life.

Similar considerations apply to the other end of the spectrum of malnutrition—the malnutrition of abundance. This is a problem of overconsumption—too many calories—which leads to obesity.

We, along with the British, lead the world in sugar consumption—more than 100 pounds on the average per person each year. On a dry weight basis, this becomes about one-sixth of our nutrient intake—one-sixth which is thus totally lacking in vitamins and minerals. Also important is the problem of overconsumption of fats. Fats have more than twice the calories of carbohydrates so the fact that they represent more than 40 percent of the caloric value of our diets is a most significant factor in weight control. Moreover, as you are aware, there is now strong evidence that saturated fats and cholesterol are implicated in the early development of arteriosclerosis which is involved in stroke and coronary disease. This, then, becomes yet another reason for the importance of better understanding of good nutrition; the need to consume a proper balance and amount of all nutrients: vitamins, minerals, proteins, carbohydrates and fats.

This subject has been covered well by an analysis in a speech by Dr. Walter A. Compton and reported in the Jan.-Feb. issue of Annal of Clinical Laboratory Science; Vol. 3, No. 1, pp. 66-77—which I will be pleased to submit for the record.[1]

Pioneered in Developing Dietary Supplements

Miles has a long standing association and interest in good nutrition, having been involved for many years in the development of products designed to help alleviate such nutritional problems. We have been a pioneer in developing dietary supplements of vitamins and iron; our involvement with these products dates back to the early 1940's. More recently we have become deeply involved in the development and refinement of a variety of protein sources to supplement animal protein. This has a twofold benefit by increasing the quantity of available protein and, perhaps most significantly, doing so without bringing into the diet significant amounts of saturated fat and cholesterol as is the case with animal protein.

We should, therefore, like to consider with you today in more detail a vital prerequisite to good nutrition; this is knowledge of the components of good nutrition and with it the willingness to select nutrient sources accordingly. Underlying much of the problem of malnutrition is ignorance. Therefore, improvement in the nutritional knowledge of the American public has for some time been a major commitment and objective of Miles.[2]

[1] See Appendix, Part NE4A.

[2] As Miles previously testified before this committee on Feb. 24, 1971, Miles sponsored a massive literature review and analysis of studies on nutritional status among U.S. population groups reported in scientific journals from 1950 through 1968. This review, "Review of Studies of Vitamin and Mineral Nutrition in the United States (1950-68)", by Thomas R. A. Davis, Stanley N. Gershoff and Dean F. Gamble was published in the fall 1969 issue of the *Journal of Nutrition Education*. In addition, Miles has for several years been a principal sponsor of the chair in human nutrition at the Johns Hopkins University school of health, presently occupied by George C. Graham

The interest of this committee in advertising of food products to children is certainly appropriate. Miles has been concerned with the nutrition of our children for many years and until last year was involved in advertising on children's programing of chewable vitamin supplements for children.

Withdrew TV Vitamin Ads to Children

In our promotion of these supplements, advertising played an important role in making the vitamin supplements acceptable to the child, once the parent had made the decision to purchase such a product. We became convinced last June, however, that continued advertising of our children's vitamin supplements on children's television was no longer appropriate. This determination related particularly to the programing but also to the number and nature of the commercials being aired on children's programs. Rather than risk undermining public confidence in these valuable nutrition products, Miles withdrew its advertising from children's programing, and redirected its efforts to parents.

For the past year we have been striving to make a contribution in the area of children's television—not, however, as a commercial sponsor, but as a contributor of material on nutrition education for use in children's programing.

We should like to show for the committee, films which reflect a first effort in this area. These films were prepared and produced by Vivian Auerbach and Associates, Inc., of New York, an organization with experience in creating instructional materials for children. We have adopted the strategy of using people with skills in communicating to children in preparing these messages and have actively consulted with other interested and knowledgeable persons to whom we are indebted. We shall continue these activities, for we are convinced that we will be able to improve these messages in our future efforts.

The films are a series of 60-second and 3½-minute presentations, including animated vignettes and live action. They have been developed as public service announcements. They are entertaining as well as informative, and are non-commercial in that they carry no product identification.

They deal with a variety of subjects such as:

1. Food as the fuel for human energy.
2. Vitamin B_1.
3. A biochemist named Casimir Funk, who coined the word "vitamine" to describe certain micronutrients.
4. Nutrients—what they are and what they do.
5. Vitamin C and its importance in the prevention of scurvy.

In the interest of conserving the committee's time, we have selected two of the longer combined live-action/animated versions, and three of the shorter animated segments.

Now if we could have the film, please.

[Film presentation.]

The three 60-second animated messages are also integrated into 3½-minute combined live-action/animated segments in the fashion illustrated by the first two films. A choice of materials is thus available for television airing as time permits. Miles is now in the process of

making these films available at no charge to individual television stations across the country.

Reception of Films by Public—Encouraging

A problem in the development of these educational films is that there is no convenient measure of their success. There are no sales figures to plot in relation to these films as there is no product identified with them.

It is difficult to devise reliable evaluation techniques for this type of material when dealing with young children. To date, a number of people, adults, professional educators, other knowledgeable individuals, and children in several schools have seen these films on an experimental basis, and their reception has been encouraging. However, as we develop our ability to evaluate the effectiveness of the materials and—probably of greater importance—begin to learn how they are received by the viewer in the home, our ability to communicate meaningful nutrition information will increase.

The evaluation of these films will also be important in determining the nature and scope of other Miles' nutrition education activities. Classroom use of similar materials would be one obvious example of a situation where the application of these techniques would be useful. In fact, we presently have under study classroom adaptation of these materials.

We believe it makes good business sense to communicate basic nutrition information to children and adults. A child who is knowledgeable and interested today in good nutrition will in adulthood be more likely to practice it. While the materials presented today are without product advertising, we believe that advertising, too, is an effective vehicle with which to convey nutritional information. Accordingly, it is our intention—and development is underway—to improve the informational content of our advertising copy, which is directed solely to parents, presenting the need for and value of dietary supplements of vitamins and iron both for adults and children.

The ultimate beneficiary of nutrition education, in whatever form, is the American public if, as a result, dietary habits and nutritional status are improved.

We appreciate this opportunity to inform the committee of Miles' interest and activities in the area of nutrition education, and thank you for inviting us to appear.

Senator McGovern. Mr. Orr, I want to commend you on behalf of the committee—you and your associates at Miles Laboratories—for the leadership and imagination you have taken in this field of nutrition education.

I think this is the exact kind of responsible leadership that the committee has been hopeful that other companies would take. We are most grateful for this report and also for your willingness to appear before the committee.

I am wondering in view of the lateness of the hour if you would be willing to agree to an arrangement whereby the committee would send you further questions in writing about anything we have about your presentation today or other aspects of the program, and before the hearing record is closed, we will give you ample opportunity to reply in writing to those questions.

Mr. ORR. Thank you, Senator, I would be delighted to do that.

I would like to comment on what I found to be a rather surprising earlier statement as to difficulty of having educational material used. We have not found this to be so. All we have done is offer this material to TV stations around the country, and we have had 78 requests for it, and in quite a short period of time. So they seem to be accepting it.

Senator MCGOVERN. I think that is very encouraging. Many thanks for your appearance here today. Our apologies for the lateness of the time.

Mr. ORR. Thank you, sir.

Senator MCGOVERN. The committee is in recess, to reconvene at the call of the Chair.

[Whereupon, at 12:59 p.m., the Select Committee was recessed.]

Appendix

MARCH 6, 1973

ITEM 1—SUBMITTED BY WITNESSES

FROM PEGGY CHARREN

APPENDIXES TO FORMAL STATEMENT

APPENDIX A

HARVARD MEDICAL SCHOOL,
Boston, Mass., November 22, 1971.

ACTION FOR CHILDREN'S TELEVISION

I believe that all advertising directed to young children is "deceptive," and "misleading", to use the language of the Federal Trade Commission Act, because children normally distort reality in accordance with their own immature view of the world. This view is quite different from the adult perception of reality and changes rapidly as the child matures. Thus, the same advertisement is interpreted differently by children and adults. To children, normally impulsive, advertisements for appealing things demand immediate gratification. An advertisement to a child has the quality of an order, not a suggestion. The child lacks the ability to set priorities, to determine relative importance, and to reject some directives as inappropriate. It is no wonder that children are unable to make a mental correction for the distortion of a piece of merchandise as presented on television, particularly when it is dramatically portrayed with booming voices of announcers, excited child participants, and rousing musical backgrounds. The child responds as much to the setting as to the object advertised, unlike the adult, and is unable to separate the two. Thus, the real toy is very often found by the child to be disappointing. Small children actually believe that cereals and vitamins as often advertised lead to superior if not superhuman strength. They are unable to assess durability or sturdiness of construction from the actual appearance let alone the favorable image presented on T.V. The child cannot judge the monetary value of advertised merchandise, an intrinsic and crucial part of the adult's evaluation and consideration. They cannot ask "is it worth the price?"

It is my understanding that the Federal Trade Commission Act and subsequent amendments assume that the respondents of advertising are adults, able to test reality as adults. The emergence of significant advertising directed towards children requires new guidelines. Because of the nature of children, I believe that all advertising for children is inherently deceptive and should be banned.

RICHARD I. FEINBLOOM, M.D.,
Acting Medical Director.

APPENDIX B

AMERICAN DENTAL ASSOCIATION,
Chicago, Ill., February 3, 1972.

MS. EVELYN SARSON,
Action for Children's Television,
Newtonville, Mass.

DEAR MS. SARSON: Miss Mary Bernhardt has told me of your request for an ADA statement which you could use in your approach to the FCC to stop all "edible advertising" for children's programs.

I enclose a pamphlet on diet and dental health which comments in some detail on the nutritional aspects of oral health.

The Association has never taken the position that all sweets should be eliminated from the diet. Being realistic, we recognize that human beings are simply not going to accept this. Therefore, we have recommended the cutting down of sweets, the limiting of the amount consumed and a thorough cleansing of the teeth after the ingestion of sweets.

I certainly think that it would be within our policy, however, to support your efforts to eliminate the advertising of candies, sweetened breakfast cereals, etc., from children's programs. Certainly it is difficult to persuade a child to limit his intake of sweets when he sees so much television advertising aimed specifically at him.

I hope this is what you need. If you have any future questions, please feel free to contact me.

Sincerely,

PETER C. GOULDING,
Director of Communications.

APPENDIX C

UNITED CEREBRAL PALSY ASSOCIATIONS, INC.,
New York, N.Y.

We, United Cerebral Palsy Associations, Inc. representing almost 300 state and local affiliates and a clientele estimated at some 750,000 children and adults with cerebral palsy, would like to submit the following statement to the Federal Trade Commission as part of the petition of Action for Childrens Television, Inc. relating to advertising of edibles on children's television programs.

We are deeply concerned about the relationship of the nutritional status of the adolescent girls and women of child-bearing age in relation to the successful outcome of pregnancy. Evidence is accumulating to indicate that poor nutritional practices around the time of puberty may have a deleterious effect upon the fetus later in that adolescent girl's life. Thus it is exceedingly important that children from an early age be taught sound nutritional practices. Television programs for children can be an important instrument in such education.

At present the advertising on television programs for children stresses the opposite of good nutritional practice. Present advertising is heavily oriented towards candies, snack foods, and other non-essential foods and there is little or no counter-balanced advertising about sound foods which should be part of a healthy diet.

We therefore urge that you take appropriate action on the petition submitted by Action for Childrens Television.

LEON STERNFELD, M.D.,
Medical Director.

APPENDIX D

[Variety, Dec. 27, 1972]

KID BLURBS: THE WRATH OF MCGRATH

OTTAWA, Dec. 26.—"No advertisement shall be permitted during the broadcast of a program devoted to children," succinctly reads Clause 1 of Bill C-237 to amend the Canadian Broadcasting Act. Conservative MP James A. McGrath introduced it in House of Commons April 7, 1971, and is still pushing for its adoption.

"Advertisers, in my opinion, are foolishly ignoring the growing concern all across the country and, as a consequence, are inviting government action by way of regulation and/or legislation by refusing to reform the advertising in a very fundamental way," says McGrath in a commentary written for the Ottawa Citizen. He's encouraged that John Burghart, v.p. and creative director of Young & Rubicam, world's third-largest ad agency, has castigated his own industry "for the content and approach of their advertisements directed at children."

After his bill was introduced, says McGrath, the Canadian Assn. of Broadcasters drew up a Code of Conduct governing kid-aimed blurbs, but it was voluntary and, after a year's operation (it was put into effect Jan. 1. '72,, McGrath finds it "has proved ineffectual, underlining the need for government action."

He notes the Quebec government now has a bill—not yet passed either—to ban all ads that "incite children to buy or invite them to incite others to buy a product." He points out, though, that only the federal government can legislate nationally, so such a Quebec law, even if passed, would not affect network blurbs.

KIDVID BOMBARDMENT

"Children lack the experience and judgment necessary to deal with advertising," opines McGrath. "And yet we allow our children to be bombarded with seductive and high-pressured sales methods, produced with subtle advertising techniques which create false images and illusions that can do irreparable damage to their concept of a real world.

"Many parents, including myself, find it objectionable and unfair to see their living rooms inundated with extremely compelling advertisements that are aimed indirectly at the parent—the real consumer—by way of the child." He quotes the Saturday Review's Robert L. Shayon as asking, in reference to wildly exaggerated ad claims, "does (the child) merely shrug it off as a game, or does he begin to develop the slow, poisonous cynicism that eventually can rob him of that which is more precious than his money—his confidence in the worth of his country's future?"

Adding that "it can also put a great deal of strain on the parent-child relationship," McGrath quotes Dr. John Coudry, professor of human development and psychology at Cornell U.. "I believe advertisements directed toward children may seriously interfere with family life by creating conflicts between parents and children, by teaching children to be materialistic and by disrupting attempts to teach the child responsibility."

He then quotes Ralph Nader's Center for the Study of Responsible Law that, in the U.S., the normal pre-school child watches tv an average of 54 hours a week—and adds that public-owned Canadian Broadcasting Corp. alone has 18½–20 hours of web programs for children each week, with an average eight commercials per hour.

"Would you allow your children to be the object of a high-pressure door-to-door salesman?" asks McGrath. "Of course not. Yet every day we permit our children to be exposed to the barrage of faddish gimmicks, tinsel toys and the fantasy land of children's television advertisements. I firmly believe our children should not be conditioned to program their desires on the basis of whichever television commercial happens to be the most seductive at a given time."

APPENDIX E

[The Louisville Courier-Journal, Oct. 21, 1972]

PAYING FOR QUALITY IN CHILDREN'S TV

A contradiction inherent in trying to produce quality programs for children on commercial television has so far defeated network efforts to satisfy discriminating parents. Quality costs money; but the readiest sources of money are the cereal, toy and other advertisers whose products many parents find just as objectionable as a steady diet of cartoon drivel.

Not that the networks have tried very hard to come up with anything that could stand comparison with the excellent programs aired on the public channels. Even though the influence of "Sesame Street"—now in its fourth season—has upgraded some of the regular fare fed to children over the commercial networks, these commercial programs started from such an abysmally low level that even

a vast improvement in quality still leaves them far short of what they could be.

Parents have become more articulate and more demanding, too, in recent years, particularly through such groups as Action for Children's Television, which has just been holding its third annual symposium on the subject. But the Federal Communications Commission, which has been feeling much of the pressure from ACT, is taking so long making up its mind what to do that it seems almost to be aiding and abetting the networks in their resistance to any change. Just the other day the FCC held yet another set of hearings, only to conclude once again that it still doesn't know enough to make any firm decisions.

What must be making a lot of people uncomfortable is that the parents are now zeroing in on the second object of their complaint—the advertisements that continually interrupt children's programs. These ads presently are allowed to occupy 12 minutes of every hour during these shows, though that will be cut to 8½ starting in January.

The primary objection, however, is not the quantity of this advertising but its content—the messages being beamed at young children who are especially susceptible to the power of suggestion. It takes a very strong-minded parent to resist day after day a child's parroted requests for another sugar-coated cereal or another over-sophisticated teen-age doll (battery not included). Even some of those adults who argue that finding out that one can't have all the goodies advertised on TV is an excellent education for a child will agree that there must be better ways of teaching self-discipline.

The counter to proposals that children's advertising be eliminated altogether is always economic, since the three major networks gross nearly three-quarters of a billion dollars from these commercials. They argue, with the backing of a report commissioned by the FCC and published last summer, that if this lucrative source of revenue were cut off the networks might have to drop all children's shows.

Yet, as ACT spokesmen argued when the FCC report came out, its study started from the premise that present methods of financing commercial television for children are the only possibility. Alternative ways—such as image advertising rather than the selling of a particular product, or underwriting by large corporations such as happens with some public TV programs—apparently are being explored in a second FCC study, not yet finished.

It may be that the FCC is stalling until this report is ready. But both it and the networks can be sure that the issue is one that won't be filibustered to death. The networks won't be allowed much longer to have it both ways—turning out trashy fare for children while raking in millions of dollars in advertising revenues from these same programs.

Appendix F

[The New York Times, Dec. 3, 1972]

Isn't It Time We Put the Children First?

By Joan Ganz Cooney[1]

When we consider alternative methods of financing children's television, it is important to keep in mind where the money is coming from now. We and our children are supplying it.

All the toys, dolls, candy bars and packages of breakfast food that we or our children purchase, supply the money that buys the advertising that pays for children's TV on commercial stations or networks. You pay for "Sesame Street" and "The Electric Company" in part through your tax dollars, and you pay for "Cartoon Corner" when you buy products advertised on TV.

Direct costs aside, the indirect costs for a commercial program are incalculable but enormous. They range from our children's bad teeth to a warped value system and the possible psychic damage that is done to hundreds of thousands of our youngsters who are urged to buy and to own what their parents cannot possibly afford to get them.

It seems to me, then, that we must simplify the issue. The first thing we must decide is whether or not we are going to put the interest of our children first. If

[1] Joan Ganz Cooney is president of the Children's Television Workshop, producer of "Sesame Street" and "The Electric Company." She gave this address at a recent Yale University symposium sponsored by Action for Children's Television.

we answer that question with a resounding yes, then everything else, including the question of alternative methods of financing, will fall into place.

We, as a total society, put the interest of our children first, then we are led to the inescapable conclusion that it is terribly wrong to be pitching products—even high-quality, worthwhile products—at the young.

It is like shooting fish in a barrel. It is grotesquely unfair. The target audience is, after all, illiterate, uneducated, unemployed and hopelessly dependent on welfare from others.

Thus, even if the program content that is sandwiched in between the commercial pitches were of positive value—and that, at best, is debatable—those who put children first would still have to take the position that trying to sell them anything is dead wrong. The hard-sell to children should be stopped.

If, in this fantastically wealthy country of ours, this means less commercial TV programing for our children, then so be it. It has not been written in heaven that three commercial networks must all broadcast similar programing for children on Saturday morning.

Maybe one, on a rotating basis, would be enough. Maybe fewer but better programs would be a blessing. Maybe the roof wouldn't cave in if all the local commercial TV stations out there felt they no longer could afford to broadcast mostly identical late-afternoon reruns, of dubious quality, aimed at children.

But I do not believe that the issue will divide this way. The men who head our major corporations and who run our television stations and networks are, on the whole, decent people. Their problem is that they are so caught up in the money-making game that they can no longer see the forest for the trees. Ask most of them and they will tell you that they work as hard as they do in order to provide the best for their children.

Perhaps what Action for Children's Television can provide, indeed has been providing better than anyone else, is a figurative bucket of cold water in the face. These executives need to be shocked back into reality; the reality that would make all children, not just their own, their number-one priority.

I am not trying to minimize the opposition. I have heard all the arguments against change. There are some on the other side in this business, who are such fanatical money-game players that they have convinced themselves that they are actually bringing a blessing to the children. And then there are some men and women who are just so venal they cannot think straight on any issue.

But our job—your job—is to capture the middle ground of corporate America and win them to the position that the hard-sell of products to children is wrong. I believe this can be done.

Many enlightened corporations are already well aware of the power of institutional advertising that brings important programs to the public without any—or at least with a minimal—sales pitch. All across America even small corporations are putting up the money for "Sesame Street" and "Electric Company" viewing at other than regular hours. At the beginning and at the end of each segment they are given credit for this underwriting. To my knowledge, none of the leadership of these companies has gotten into any trouble with their stockholders, nor do any of them feel they are wasting their money.

The networks and local stations must also make their contribution, perhaps by special rates for the institutional advertiser and by the removal of children's programming from the profit center of broadcasting.

The real question is: Can we afford not to begin?

Appendix G

[The New York Times, Feb. 21, 1973]

Instead of Potato Chips, the Children Tried Bananas Dipped in Wheat Germ

By Jean Hewitt

Three- and four-year olds at the Henry Street Settlement Day Care Center were fixing refreshments to serve at an open house for their parents on a recent morning, but not a cookie, cupcake, soda or potato chip was in sight.

The children were working with fresh fruits, cheese, guava juice and milk as ingredients to make imaginative snacks.

Tots in one gaily decorated classroom were spearing cubes of processed cheese on enriched pretzel sticks for pretzel lollipops. Others were stringing cubes of apple, banana and pineapple on sticks for a kebab snack to be topped with a bright red cherry.

In another classroom youngsters were blowing bubbles bright with food colors while some of their peers beat together a mixture of guava juice, milk and ice cubes to make a punch they called champola.

Many of the banana slices dipped in wheat germ disappeared into tiny mouths before they ever reached the serving plate. The youngest group of all, "the early threes," was putting together individual serving cups of a cereal-based snack mixture.

Tiny fingers added raisins and peanuts, one by one, to a mixture of unsweetened, fortified oat and wheat dry cereals. Some of those ingredients were sampled along the way, too.

The open house activities were the culmination of a 12-week course conducted at the center by Elaine Rose Ruderman to encourage the teachers to get the children cooking, enjoying new flavors and thinking about nutritious foods.

Mrs. Ruderman is with the Cooperative Extension of Cornell University here. She gave training sessions each week on a different cooking theme for teachers from each of the six classrooms at the center.

The following day the teachers had the children perform the same techniques, make the same snacks or dishes, learn why the food was good and then taste it to see that they even liked it, too.

Many of the 90 children bring a candy bar, which is the only food they have until lunch. Regulations require that the children be served a balanced and nutritionally-adequate noon meal, but it is difficult to get some of them to eat it, according to the center's administrative director, Norma Sepulveda.

About 60 per cent of the children are Puerto Rican, many of them raised on ethnic dishes, and many of the lunch foods are unfamiliar to them. The director recalled one Chinese boy who would eat only when rice was on the menu.

The children are introduced to new foods and the meaning of such words as stir, slice, spread and smell. "Every child can succeed in this," Garnetta Chain, the educational director, said. "They eat their mistakes, too."

During the sessions the children have made peanut butter and butter from cream and found what fun it can be to cut raw vegetables into shapes. They were used as dippers and to make open sandwich faces.

A group of 4½ year olds worked together the day of the open house preparing their own lunch. Under the watchful eye of their teachers, Sherry Mandel and Mrs. Casildo Rivera, they cooked chicken and rice and tostones, which are fried green plantains. Mr. Lesleigh Hogg was the teacher directing the salad making operation. He also read a story for the quiet period before the 11 youngsters sat down at the table to sample the results of their labor.

"My Mummy makes rice and meat, too," one little girl told anyone who cared as she spooned the main course on to her plate. One cup of apple juice that overturned was the only mishap and appetites appeared large compared with the size of the eaters.

Some of the nutrition information and new ideas for snacks have been taken home by the children, judging by questions parents ask when they come to pick up their charges. Recipes written in English and Spanish are made available when requested.

As an extension of their cooking experiences, the children have been growing beans, pineapple and beet tops and discovering where foods come from. Colorful posters of fresh vegetables and fruits vie for space on the walls with the pupils' original art.

Similar training sessions are given by Cooperative Extension specialists in other parts of New York State in such places as migrant worker camps and to Family Day Care Mothers who are paid to take care of children of working parents in their own homes.

[News Release, Action for Childrens Television, Mar. 6, 1973]

ACT FILES COMPLAINTS AGAINST CEREAL AND CANDY COMPANIES AND CBS-TV NETWORK

Eight complaints against television ads directed to children for cereal, snack foods and candies were filed today (Mar. 6) with the Federal Trade Commission by Action for Children's Television (ACT) citing General Mills, Kellogg, Curtis,

Mars Manufacturing, Post Division of General Foods, Hershey Foods, Quaker Oats and the CBS television network which aired the ads.

The complains specified commercials which, ACT declared, directed "unfair and misleading advertisements to children" on children's television programs on Saturday morning, October 28, 1972. The TV ads were for: Sir Grapefellow cereal, Baron von Redberry cereal, Pop-Tarts snack, Danish-Go-Rounds snack, Baby Ruth candy bar, Milky Way candy bar, Fruity Pebbles cereal, Cocoa Pebbles cereal, Froot Loops cereal, Hershey's Instant Milk additive and Vanilly Crunch cereal.

The announcement of the complaints was made by ACT President Peggy Charren during testimony before the Senate Select Committee on Nutrition and Human Needs, in Washington.

> A medium which could be a powerful educational tool to inform the American public of good health and nutrition is instead a vehicle for falsehood, misinformation and misleading persuasion, she said to the Committee. TV advertising presents several dangers to the health of children —the most significant are dental caries, the exclusion of more nutritious foods from the diet, obesity, and other health problems which arise in adulthood as a result of a taste for sweets acquired during childhood.

ACT stressed that the consumption of non-nutritious and sugared foods as snacks was a major cause of dental caries. In a study of several hundred five-year-olds, a direct correlation was found between the number of snacks eaten and the number of caries in the children's teeth.

> Those who ate one snack had a caries score of 4.8, two snacks, 5.7, three snacks, 8.5; and four or more snacks, 9.8 stated Mrs. Charren. It is not the amount of sugar ingested but the frequency of intake

An analysis of ads directed to children on a Saturday morning found that almost all of the food products were for sweet, sticky snack foods, the most likely foods to cause caries. There were NO ads for apples, pears, oranges, carrots, celery, nuts, cheese, fish or eggs.

ACT also filed supplementary data with the Federal Trade Commission as an addition to its earlier filing on edibles advertising to children.

In the additional filing, ACT stressed its concerns with the high sugar content of foods advertised to children, and the misleading food information being presented to children in commercials

ACT, a national organization with headquarters in Newtonville, Mass., has urged both the Federal Trade Commission and the Federal Communications Commission to set regulations prohibiting TV advertising to children but so far no action has been taken.

Copies of the supplementary filing and the eight complaints, prepared with the assistance of Daniel Badger and Judith Brain, are available from ACT, 46 Austin Street, Newtonville, Mass. 02160, on request.

THE KIDVID REBELLION

By Margaret English

Commercial children's television is perfectly ghastly, as anyone who has a child and a TV set knows. Every Saturday morning from 8 a.m. to 1 p.m., the networks run children's programming exclusively ("the Kidvid ghetto" they call it), two-thirds of it cheapo cartoons full of socko fast cuts and dynamite action sequences that little kids are supposed to just love.

A couple of years ago, the networks caved in to adult criticism and cut down on the cartoon violence. As one vice president in charge of children's programming (Kidvid VP) put it, "We don't show Mighty Mouse raping and pillaging anymore." But mayhem still prevails in the form of adventure and chase cartoons. Monsters and villains still abound, often in the form of racial sterotypes that wouldn't be tolerated on adult programs.

As if the shows weren't bad enough, 16 commercial minutes are allowed during each Kidvid hour, as opposed to ten for prime time. That means that more than 25 percent of your kid's Saturday morning tube time is spent watching commercials. For about nine months out of the year, cereal is the biggest item, most of it the sugarcoated variety, the least nutritious of the maker's line. In the fall,

the cereal ads give way to toy commercials in order to crank the kids up for the Christmas bonanza. This is where the real money is. In fact, the networks sell your child's attention at a higher per-minute rate during the pre-Christmas season. Some local stations that don't even carry children's programs during the rest of the year rent a bunch of cartoons for fall just to cash in on the toy trade.

What do all these hours of commercials do to kids? Their job, for one thing. Kids believe commercials. Any vitamin that's good enough for Fred Flintstone is good enough for them. They want the stuff they see advertised, and they nag, cry and carry on until they get it. But what happens then? The dancing doll doesn't move all by herself as the ad suggested. GI Joe bombs out on the living room rug, and the kids turn cynical.

Despite the cynicism, however, the young retain the deepest concept expressed in every commercial aired—the notion that you will be a happier, better, more desirable person if you acquire, apply or ingest some product. No personal problem need be endured for long. No need to be lonely. Barbie Doll will keep you company. No need to be little. Vitamin-enriched bread will build you up. Our minds and bodies are nothing but machines that something off the shelf can repair. Is it any wonder that the first TV generation is also the first in which thousands of middle-class kids have sought to obliterate their problems by turning to drugs (products)?

By 1968, three ladies in Newton Centre, Mass., were mad enough to do something about the TV sell game. Over their kids' shrill chorus of demands for TV toys, Evelyn Sarson, Peggy Charren and Judy Chalfen sat down and actually watched the kiddy shows, and there was damned little on the tube they wanted their kids to see. Most programs, they felt, were no more than attention-getters for the hard sell. Some seemed to be pure sell. No one could tell when the *Romper Room* lady stopped teaching the kids a game and began shilling for the *Romper Room* line of toys, without which, incidentally, the games couldn't be played.

The ladies, calling themselves Action for Children's Television (ACT), went after the *Romper Room* folks and accused the producers of exploiting their kids. Business is business, replied the *Romper Room* gang, and told the mothers to shut it off if they didn't like it. ACT took their advice.

Realizing that they would have to go over the heads of the Kidvid producers, ACT went to the FCC with a petition for three new rules for children's television, calling for no commercials on kids' shows, no mentioning of products by brand name on kids' shows and, finally, 14 hours a week of commercial-free children's programming as part of each station's public-service requirement.

To everyone's amazement, the FCC agreed to consider the proposals and invited the public to submit comments. "The public," naturally, meant the broadcasters, since the FCC has no real way of soliciting opinions from you and me. ACT decided to help them out.

ACT had been brought into the limelight by the FCC's response to its petition. With each new press notice, the ladies from Newton Centre struck more live nerves in Kidvid-plagued homes. Letters and donations arrived from all over. The ACT ladies wrote back with instructions on how to file a formal comment with the FCC. By July, 1971, the Commission had heard from over 60,000 people.

The networks and advertisers poor-mouthed, sidestepped and sweated. Not that they expected the rules to be adopted, but they saw the move as a sign of more aggressive attitudes by the traditionally easygoing Commission.

Prodded by ACT and the FCC, and pulled by *Sesame Street*'s ratings (yeah, *Sesame Street*) the Kidvid VP's started kicking around a new concept that might just get them off the hook—Edvid. By upgrading kids' shows, they could argue that commercials were a necessary evil to be endured for the sake of culture. Suddenly it was Responsibilityland, and the Kidvid VP's were tripping all over each other in their search for meaningful, sensitive, creative, *educational* children's programs.

Next season, each network is highlighting a new Edvid show—*Take a Giant Step*, NBC, *Curiosity Shop*, ABC, and *You Are There*, CBS. Each has been created by intelligent, talented people and appears to be a sincere effort at worthwhile programming for children, and, for what it's worth, it ain't *Woody Woodpecker*.

Of course, Woody will still be on, as will *Sabrina, the Teenage Witch* (formerly of *Sabrina and the Groovie Goolies*) and a mess of other cartoon creatures. After all, as one network official said, "A kid comes home from a hard week at school, and he doesn't want any more education. He wants to relax and be entertained." So three hours of Saturday morning Edvid will be surrounded by 12 hours of the same old relaxing, entertaining Kidvid mayhem. But it's a start. Furthermore, the networks promise a softening of hard-sell ads and fewer kid-show characters

(live or cartoon) shilling for cereals, vitamins and toys. It sounds promising, but the industry is known for its promise. If Edvid doesn't sell, it's back to *Dastardly and Muttley.*

In the meantime, ACT will be keeping up the pressure with the aid of a $164,000 foundation grant. We can help, the ACT ladies say, by refusing to buy any toy we see advertised on TV and letting the manufacturers know it. (This isn't as hard on the kids as it sounds. There are lots of good unadvertised toys around, and they're cheaper.) Also, we can teach our kids to be selective viewers. With a little encouragement, they can develop a taste for good shows and learn to reject worthless ones. We might even try setting an example by refusing to watch adult junk. Finally, we too can nag the FCC and the networks. The ACT ladies alone can't go on fighting for our kids forever.

CHILDREN'S HOUR

By Joseph Morgenstern

For a couple of decades, criticism of children's TV centered on violence. All those shootings and beatings were tabulated and quite rightly declared excessive. Until recently, though, critics and scholars were blind to one of the most potent instruments of violence the medium turns on children, the TV commercial. Not a word, in academic studies, about the violence commercials may do to a child's capacity for trust. Not a word in Congressional hearings of the violence they may do to a child's intellectual development. Now we're beginning to get some research on that subject too, and the early results are fascinating. While they confirm our worst suspicions of what commercials do to kids, the data also debunk our most widely held notions of how kids react to a message from the sponsor.

The most dismaying, though not necessarily the most surprising, discovery of a study just completed at the Harvard Business School concerns kids' faith in what they're told by Saturday-morning TV advertising. As early as second grade, children indicate "concrete distrust of commercials, often based on experience with advertised product." By fourth grade they have "distrust for specific commercials and 'tricky' elements of commercials." By sixth grade they show "global distrust" of all commercials except public service announcements.

Cynicism

"Moppets Found Cynical," reads the headline of a marketing newspaper's story on the research, which was supported by the National Institute of Mental Health and the Marketing Science Institute. That may not be quite accurate. A child's mistrust may not yet be hardened into cynicism. What's more, this part of the research was based on a very small statistical sample, a fact that is stressed by Scott Ward, the Harvard Business School professor who directed the study. "If these preliminary results hold up in further interviews, as they seem to be doing," Ward says, "then there really is a trend toward cynicism somewhere around the second to the fourth grade. Still, we need a much broader sample, and we need more money to achieve it."

Another part of the study does have a broader sample, however, and its conclusions should put an end to the popular fiction that kids like the commercials even more than the programs. "All children exhibit a *drop in attention* when a commercial is shown," the study says (italics mine), "compared to prior attention to programming, and attention continues to decrease during later commercials in a series." This drop was most pronounced for older children, those between 11 and 12, but it existed for all children in the study. Disinterest and mistrust simply increase with age until "a picture emerges of older children jaded to commercial expostures, paying less attention to them, and making fewer comments about them—especially positive comments." What's to be made of this? Should we be pleased with our progeny for developing such an early mistrust of hucksters and turning them off so efficiently? To the contrary, I think we should be appalled that they're being lied to, incessantly and systematically, by the most influential teacher in their lives.

Ragged

On the surface, a reform movement seems to be sweeping children's TV. The FCC is looking into program content and commercial policy. The FTC has put a stop to a few of the most flagrantly deceptive toy ads. A $1 million study of violence

in children's programs will be released this fall by the U.S. Surgeon General's office. The networks are pursuing their own violence studies, and better children's shows are promised for next season. Some stations already have increased their children's schedules and reduced the number of commercials within them. A few broadcasters are also experimenting with clustered commercials that appear before or after each local program rather than within it.

In TV, though, reform usually means a slight mending of incredibly ragged ways. The new children's programs may be an improvement over the present ones, but there'll be so few of them, and so many reruns, that Variety has already dubbed it "the shortest TV season in the world." The FCC can't possibly keep up with sponsors' indifference to truth and disregard for children's mental or physical health (there's a big push on now for a breakfast food with chocolate and marshmallows in it). And the networks are perfectly willing to go along with those solemn studies of violence, so long as they divert public interest from the far more crucial issue of commercials. Children's programs represented about $75 million in network revenues last year, according to Broadcasting magazine. That's almost half as much as the networks took in from cigarette advertising before that gold mine was closed down.

No one could have predicted a few years ago that cigarette advertising would be eliminated from TV. Yet it was, and now it's equally urgent to eliminate all advertising from children's programs, as an influential citizens' group called Action For Children's Television has been urging the FCC to do. Eliminate it, not reduce it or cluster it. (The clustering fad is doomed at the outset: advertisers are bound to catch up with the significance of the Harvard findings that kids pay even less attention to commercials at the end of a cluster than those at the beginning.) No compromise can be reached between TV that tries to sell things to kids and TV that doesn't. Either we respect a child's vulnerability or we don't.

Robots

This assumes, of course, that we want our kids to grow into something more than wily purchasers who've learned from bitter experience that life is one big con, that everything ties into everything else out of mutual greed, not mutual need. Commercials do teach children certain "consumer skills" in a crude, inefficient way. The Harvard study corroborates this. But the study also suggests that American kids are far less tempted than we've thought by glowing pictures of goods and services. They seem to be resisting the role of acquisitive robots. If they must learn consumer skills, let them learn in an intelligent, efficient way from child-oriented programs. For the rest, let them be free to pick up all the information and delight they can find without fear of booby traps. The proper number of commercials per children's hour is none.

FROM ROBERT B. CHOATE

READER'S DIGEST,
New York, N.Y.

DEAR MS. DINSMORE: In recent months, the advertising of some industries and groups has been given increased "attention"- often in the form of criticism that is directed at the claims made on behalf of products and services used every da ' by millions of Americans.

Unfortunately, this creates an explosion of headlines and an atmosphere where a reasonable presentation of all aspects of the issue is impossible. As a result, the consumer, bombarded with a mass of conflicting information, becomes confused and skeptical.

The Sugar Association, one of those criticized, in a positive effort to counter the negative news has chosen to use its advertising space to tell the consumer of the place sugar has in our everyday diet. They believe their message is a meaningful, objective judgment on this vital health and nutrition issue.

I have attached a Sugar Association advertisement, prepared by Sugar Information, from our November issue. I hope you will take a few minutes to read it. Your comments will be most welcome.

Sincerely,

CHARLES D. HEPLER, *Publisher.*

FROM MILES LABORATORIES, INC.

ANNALS OF CLINICAL LABORATORY SCIENCE, Vol 3 No 1

SPECIAL ARTICLE

Nutrition In Our Society*

WALTER AMES COMPTON, M D.
President,
Miles Laboratories, Inc., Elkhart, IN 46514

This Association needs no reminding of the need for new and better therapies, diagnostic procedures and, preferably, preventive agents as patterns of disease change. The continuing development of drug-resistant strains of pathogenic organisms, the rise in prominence of the so-called diseases of immunity, of viral diseases, cancer and degenerative vascular diseases demand unremitting attention and effort at the levels of both basic and applied research. But here I should like to turn your attention to a problem all too long neglected and one of major proportions in our own society: a problem of serious medical, ecological, social and economic consequence—malnutrition—the malnutrition of both deficiency and abundance, a problem both national and international in scope

Nutrition is a critical factor in human biology and cannot be divorced from health. Adequate nutrition is the physiological utilization of essential nutrients in the amounts and balance necessary to promote optimum physical and mental function from conception to death. Malnutrition embraces undernutrition (the extreme of which is starvation), overnutrition and nutrient imbalance. It is an impairment of health and physiological function resulting from failure of the individual to obtain all essential nutrients in proper amount and balance. We have become accustomed to think of the malnutrition of nutrient deficiency and starvation as problems unique to the economically and technologically deprived countries of the world, where the malisons of overpopulation, famine, disease, ignorance and apathy have been accepted more or less stoically as the heritage of man. It was a shocking revelation to many that malnutrition of both types—lack of food and lack of specific nutrients—exists in America

Malnutrition of Deficiency

In this land of super-agriculture, super-medicine, super-abundance and a leisure economy, millions go to bed every night hungry. Yet, the Citizens Board of Inquiry Report[1] and the report of findings of the National Nutrition Survey before the Senate Select Committee on Nutrition and Human Needs[2] have documented beyond question the broad scope of the problem in various sectors of the U.S. Malnutrition, because it can have so many manifestations, is insidious and in its more extreme forms inflicts harm not only on the individual but, where widespread, can do damage to the moral and economic fiber of the nation. When one considers that, at two years of age, the growing child has achieved fifty percent of his physical stature and much more than that of his neurological and cere-

* Presented before the 41st Meeting of the Association of Clinical Scientists in Elkhart, IN, April 1972

bral equipment, the urgency of an early beginning of good nutrition is apparent. A defective structure laid down at this time as a result of undernutrition will have most serious and even irreparable consequences.

Recently, Krumdick has cited malnutrition as a major factor in the development of our urban slums.[3] As a consequence of mechanization of agriculture, the consolidation and disappearance of family farms, the emphasis on cash crops and single species cultivation, nutrition has suffered among our rural populations. In turn, there has been a mass migration from rural areas to the cities in the quest for "better" living conditions. Over the past twenty years, from one-half to two million people per year have moved from the farm to the city, taxing the living space, schooling and ancillary facilities of the urban communities often beyond capacity. As Krumdick states: "No other single factor affects the slum inhabitant as adversely as malnutrition. In the adult, it lowers his working capacity and makes him more susceptible to disease and less capable of tolerating the physical environmental insults or physiologic demands of pregnancy or lactation. The children who survive face the tragic fate of being less endowed because they either suffered irreparable brain damage early in life or lost their opportunity for receiving an education due to frequent illness or because of having spent their school years in the lethargy of the undernourished. Because it affects the health and productivity of the inhabitants, a poor diet constitutes a key factor in the perpetuation of slums. Only when a reasonably good level of nutrition has been attained can the slum dweller concern himself with the secondary matters of improving his surroundings."[3]

The effects of undernutrition on the infant and the young child can be devastating. In its severest forms it can lead to death. Overt undernutrition can produce physical and mental impairment, marking the individual life. In its more covert form, we find the child with shortened attention span and reduced learning capacity, even though there be no detectable mental impairment. The nutritional state of the mother is an important factor in maternal illness, fetal deaths, reduced survival ratio in premature infants, neonatal deaths and in infant morbidity.

Traditionally, there has been a complacent feeling about nutrition in this country, based on the misconception that the so-called "average" American diet will automatically take care of all nutritional problems. Until recently, this misconception has been perpetuated in many of our medical schools and governmental agencies. For example, the Food and Drug Administration, a few years ago, proposed a regulation which would require this statement on the labels of vitamin-mineral supplements:

> "Vitamins and minerals are supplied in abundant amounts by the foods we eat. Except for persons with special medical needs, there is no scientific basis for recommending routine use of dietary supplements."

This is based upon the false premise of an "average American diet" arrived at by dividing foodstuffs consumed by population. Such "average" diet does not exist, is not practical, nor would it be acceptable. I am reminded of the man who drowned in a river whose average depth was three feet. With more freedom of food choice than in any other country, Americans, as a whole, poorly understand, and much less conform to, the rules of good nutrition; taste or caprice, rather than nutritive value, have become the predominant factors in food selection.

While final estimates of the incidence of hunger and malnutrition are still wanting, the preliminary findings of the recent National Nutrition Survey[2] under the direction

of Dr. Arnold Schaefer leave no doubt as to the magnitude of the problem. While the Survey deliberately concentrated on areas of lowest income, it also involved families in the middle income groups Clinical, biochemical and dietary factors were involved in the assessment of nutritional status. Biochemical studies are concerned with the measure of tissue concentrations and urinary excretion of nutrients which may not be sufficiently low as to have produced clinically overt disease. The nutrients of which I speak include vitamins and minerals which are intimately involved in the myriad of enzyme modulated biochemical processes which continually take place within us. Low biochemical findings in the absence of clinically overt disease are indicative of an "at risk" state of health—i.e. continuing failure to obtain proper diets. Under such conditions the introduction of stress (e.g., infection or trauma) may lead to overt disease.

Dr. Schaefer's study, to date, has shown that in one state as many as five percent of children under six years of age had clinical signs associated with previous Vitamin D deficiency; that is to say they at one time had rickets. Almost five percent of the children studied show winged scapula, pot belly or both—signs of protein-calorie malnutrition. Five percent of subjects have goiter—evidence of iodine deficiency. According to the World Health Organization criteria, this level indicates that goiter, a disease we thought we had eliminated thirty years ago, is endemic in our population.

One-fourth of the children under six years of age have hemoglobin levels in the unacceptable range. Unacceptable levels of Vitamin A were found in fifty percent of the same age group. Vitamin C levels were less than acceptable in ten percent of those surveyed.

Fifteen percent of the children in the undernourished population studied at the poverty level are retarded in physical growth, their mean height per age being five to fifteen percent less than that observed in well nourished populations. There was a high prevalence of low birth weight—less than five pounds—ranging up to an incidence of twenty percent among poor groups Other studies by the U. S. Department of Agriculture comparing household food consumption data in 1965 as against 1955 indicated that the nutritive value of diets has been declining rather than improving over the last ten years, despite the rise in medium incomes over this period of time.[4]

During the hearing begun in 1968 by the Food and Drug Administration on "Foods for Special Dietary Uses," a large amount of survey information was collected regarding the nutritional status of various population groups. In connection with this hearing, we commissioned Arthur D. Little, Inc., to conduct a literature search and analysis of studies of nutritional status among United States population groups reported in the medical literature from 1950 to 1968. The reviewers also sought to identify those sex, age and socio-economic groups among which vitamins/minerals malnutrition was found to exist. This review[5] revealed that from 31 percent to 57 percent of all individuals examined have consumed diets which were not sufficient to furnish the recommended amount of the micronutrients considered, which include Vitamin A, thiamine, riboflavin, niacin, Vitamin C, calcium and iron.

At a recent appearance before Senator McGovern's Select Committee on Nutrition and Human Needs,[6] I noted the importance of furnishing adequate low-cost multivitamin supplementation to the disadvantaged, such as the three million Americans who are still receiving their food through the Department of Agriculture's Commodity Distribution Program and the 8.2 million children now participating in the School Lunch Program, who receive one

good, well-balanced meal on the days they are at school, but whose parents may well lack the knowledge or financial ability or, sadly, the initiative to provide them with comparable meals at home.

For our disadvantaged, and indeed equally appropriate for all our population, the availability of a rationally formulated, low-cost vitamin supplement provides the most efficient and economical way of delivering these micronutrients at least until such time as we have reached that ideal state where all our population has sufficient resources to purchase table foods without economic restraint; where all are educated as to the necessity for proper selection, preparation and consumption of a varied diet and, perhaps most difficult, where they are willing to do so!

As a specific illustration, consider the School Lunch Program. The basis of this Program, the Type A lunch, is designed to provide about one-third of the day's nutrition and includes about one-third of the recommended daily allowances of the essential vitamins and minerals. The children receiving these lunches are in school at most five days a week through nine months of the year, thus, the School Lunch Program supplies only about one-sixth of their total nutritional needs. Moreover, there is no guarantee that the food in the Type A lunch will reach the table with the vitamin and mineral content still intact, or that the children will eat all of the food in the lunch once it is on their plates. It seems obvious that the Lunch Program, as it is now constituted, cannot alone insure adequate vitamin and mineral intake by the children participating in it.

A vitamin-mineral supplement to the Type A lunch, in place of concern for random and more expensive vitamin reinforcement of the various food staples, could easily and cheaply be supplied and could guarantee delivery to the children of not just one-third but rather all of the essential micronutrients in the recommended daily amounts. Thus, if the rest of their diet supplied adequate protein and calories, we could be a great deal surer than we are now that these children are adequately nourished.

By using the supplements to assure micronutrient intake, the school lunch meal planners would gain economic flexibility such that more than 95 percent of their hard-pressed budgets could be made available for such expensive dietary content as high-quality protein, so important to growing children.

Malnutrition of Abundance

Let us look now at the other end of the spectrum of malnutrition—the malnutrition of abundance. Generally, overconsumption is a problem of too many calories which leads to obesity about which you have heard so much and which affects almost forty percent of our population. We lead the world in sugar consumption—more than one hundred pounds on the average for each person per year. On a *dry weight basis*, this becomes about one-sixth of our nutrient intake—a sixth which is thus totally lacking in vitamins and minerals! But probably and generally much more important is the problem of overconsumption of saturated fats. First of all, fats have more than twice the calories of carbohydrates, so the fact that they represent more than forty percent of the caloric value of our diets is a most significant factor in weight control. Moreover, saturated fats and cholesterol have been strongly implicated in the premature development of atherosclerotic vascular disease and particularly coronary heart disease. According to the Executive Board of the World Health Organization:[2] "Coronary heart disease has reached enormous proportions, striking more and more at younger subjects. It will result in coming years in the greatest epidemic mankind

has faced unless we are able to reverse the trend by concentrated research into its cause and prevention."

The corrosion of the inner surfaces of the medium- and large-sized arteries of the body by the accumulation of various fatty materials, such as cholesterol, phospholipid and triglycerides, forms plaques obstructing blood flow to vital tissues. While atherosclerosis is one of the expected consequences of advanced age, its premature occurrence in persons under 65 years of age is increasing at an alarming rate and is the major cause of death in this country. The National Health Survey of 1960–62 estimated that 3.1 million American adults aged 25 to 79 had definite coronary heart disease and an additional 2.4 million had suspect coronary heart disease, together representing about five percent of this age population. It was further estimated that premature coronary heart disease, occurring in Americans under age 65, affects almost 1.8 million persons, while an additional 1.6 million have suspect coronary heart disease.[7]

One cannot help but reflect upon the seemingly remarkable increase in incidence of coronary heart disease in the post 50 years. In 1918 when the electrocardiographic changes of myocardial infarction were first described, it was regarded as so uncommon that "most medical students and house officers never heard of the disease during the period of their clinical training."[8] Even taking into consideration the advances in diagnostic apparatus and professional acumen in its diagnosis in subsequent years, the demonstration of increasing incidence in subsequent decades has been regarded by most as a real phenomenon and not a mere "statistical mirage produced by increased knowledge and more accurate diagnosis of coronary thrombosis and changing fads in medical nomenclature."[9]

The facts are, according to the Report of the Intersociety Commission for Heart Disease Resources,[7] that each year approximately one million persons in the U. S. suffer [illegible]er a myocardial infarction or sudde[illegible]ry heart disease death. There a[illegible]000 deaths due to this cause alo[illegible], additional 200,000 succumb to [illegible] of major arterial vessels in other p[illegible] of the body. Approximately 165,000 of the coronary deaths occur in persons under age 65, men outnumbering women in ratio of 3 to 1. We are told that a male citizen of the U. S. has about one chance in five of developing clinical coronary heart disease before age 60, principally in the form of myocardial infarction. Most appalling is the fact that about 25 percent of those who experience a first premature heart attack die within three hours of the onset of symptoms, all too often prior to hospitalization and before medical care can be obtained.

The United States has the dubious distinction of ranking second only to Finland and Scotland in coronary heart disease deaths, with a rate of 354 such deaths per 100,000 populat[illegible]. In contrast, the coronary heart disease mortality rate in France is 74 per 100,000 and 51 per 100,000 in Japan, while that for England and Wales is 254.[7]

The precise etiology of atherosclerotic vascular disease remains to be defined and, of course, is multifactorial, involving genetic and multiple environmental factors. But, over the past twenty-five years, numerous risk factors contributing to coronary heart disease have been identified, such as habitual diet high in saturated fat, cholesterol and calories; elevated levels of fatty substances in the blood; hypertension; cigarette smoking; diabetes mellitus; obesity; sedentary living and psychosocial tensions. In the past 16 months, the Intersociety Commission for Heart Disease Resources, a group of biomedical scientists representing thirty of the nation's medical and scientific societies, has issued a report on the urgency of

the problem.[7] The Commission concluded that the three major risk factors associated with coronary heart disease are diet, cigarette smoking and hypertension. Of these, our habitual diet, characteristically laden with cholesterol and saturated fats, and overabundant in calories, clearly is of major concern. As recently noted by the American Health Foundation's Committee on Food and Nutrition,[8] data from the U. S. Department of Agriculture indicate that in the past half century the American diet has undergone significant evolutionary changes with increased consumption of meat, poultry, dairy products and refined sugars and a concomitant decreased use of cereals, potatoes and other starchy foods. It is of particular interest to note that even recently there has been a significant increase in the proportion of calories derived from fat from about 30 percent in 1930 to about 43 percent in 1970.

Because of the urgency and magnitude of the coronary heart disease problem to national health, the Commission "recommends that a strategy of primary prevention of premature atherosclerotic diseases be adopted as long-term national policy for the United States and to implement this strategy that adequate resources of money and manpower be committed to accomplish: (1) changes in diet to prevent or control hyperlipidemia, obesity, hypertension and diabetes, (2) elimination of cigarette smoking, and (3) pharmacologic control of elevated blood pressure." The Commission recognized that we cannot wait the necessary ten years it would require for the results of long-term trials to prove the efficacy of various interventions, particulary diet modification, on the rates of premature atherosclerotic diseases in the U. S. and has recommended that "safe and reasonable" changes be made immediately to achieve a low-saturated fat, low cholesterol diet for the American population.

The Commission has further recommended that the food industry be encouraged by the medical profession, the government and the general public to make major revisions in food processing to reduce fat and cholesterol content by: (1) producing strains of animals that convert higher proportions of feed to protein rather than fat, (2) use of cows that produce large amounts of high-protein, low-fat milk, and (3) the further development of high-quality protein products of vegetable origin.[7]

As a member of the food industry, and through its Worthington Foods Division, Miles is heavily involved in the rather new technology of textured vegetable proteins as meat analogs and meat extenders. With the growing food demands of an increasing population and the shrinkage of farm land area as a result of urbanization, there will be growing need to devote farm land and labor to their most efficient use. Significantly, from an economic standpoint the conversion of vegetable protein into textured proteins foods suitable for consumption is far more efficient than conversion into animal protein. A grazed acre of land can produce 58 pounds of animal protein, but if the same acre is planted to soy beans for use in textured protein food, it will yield 508 pounds of vegetable protein.[10] By virtue of a rapidly developing technology, protein from various vegetable sources may be efficiently employed to make high protein, micronutrient-fortified, fabricated foods low or free from cholesterol which simulate beef, swine and fowl meats as well as certain seafoods in flavor, texture and physical appearance, affording high nutritional value and economic advantage to the consumer. I am of the firm conviction that there can evolve from such developing technology effective and economic solutions to the dire problems of protein scarcity among the more grossly disadvantaged peoples of the world and the development of major new protein sources for us all.

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ITEM 2—ARTICLES PERTINENT TO THE HEARING

[Excerpt From]

CHILDREN'S TELEVISION: ECONOMICS AND PUBLIC POLICY

By William H. Melody*

Chapter VII

TOWARD THE DEVELOPMENT OF PUBLIC POLICY IN CHILDREN'S TELEVISION

I. Public Interest and Private Interests

The foregoing analysis has pointed up how the differences in primary objectives between the economic criteria of profit and the social criteria of children's needs and desires has created a fundamental conflict of priorities across the entire structure of the broadcast industry, its institutions and their operations. As "public trustees," broadcasters are charged with performing in the public interest. According to regulatory law, the public interest takes precedence over the broadcaster's private economic interests. "It is the right of viewers and listeners, not the right of broadcasters, which is paramount."

Although this principle is clear in theory, in application the broadcaster must make a continuing series of trade-offs between his own private economic interests and the public's interests, as he interprets those interests. It can hardly be surprising that he almost universally inverts the order of priorities between private and public interests. Indeed, that is why the FCC was created. Supposedly unencumbered by the constraints of a vested personal financial interest, the Commission is charged with the responsibility of ensuring that the socially beneficial trade-offs between the public and private interests are made.

Until the present time, in the area of children's television the trade-offs between the public interest and private financial interests have been left to the industry. The analysis of earlier chapters has shown that within the industry, the fundamental decision makers for these crucial trade-offs have not been the broadcast stations, which are under direct regulation by the FCC, but the broadcast networks which do not have the same public interest responsibilities imposed on them that are imposed on the stations. Thus, in these areas of decision making the broadcast stations are not masters of their own fate. The real center of power for managerial discretion lies with the networks—institutions that do not have the formal obligations of public trusteeship. Trade-offs between public and private interests by broadcast stations in children's television become ancillary to those made by the networks.

The record of performance in children's television by the networks indicates that they have not treated children's television as a unique public interest responsibility that would require them to deviate from their profit maximizing behavior. This is so even though the networks have substantial monopoly power over both programming and broadcast station relations, power which in other industries occasions close government scrutiny via the antitrust laws and/or direct regulation. Similarly, the great majority of broadcast stations, although severely constrained in their options by the overshadowing presence of network policies and practices, have not recognized children's television as a particular public interest responsibility that would require deviation from their profit objectives.

In contrast, the ACT petition to the FCC requests a complete reversal of decision priorities, establishing the criterion of the needs and interests of children as the controlling purpose of children's television. The petition claims that the economic interests of the broadcast industry diverge substantially from the interest of the

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child viewer and concludes that the latter can never be served appropriately as long as children's television is being supplied in response to an advertiser supported market. The FCC must now consider the scope of its regulatory discretion in determining an appropriate public policy response on the issue.

II. The Issue of Children's Television

There are two quite distinct aspects of the children's television issue. The first addresses the problem of potential harm to the child from such things as aggressive advertising techniques directed at the child and violent children's programs. The second aspect addresses the positive side of the issue by questioning the responsibilities for developing constructive children's programming in accordance with *only* their needs and interests. But even this distinction does not fully clarify the specific dimensions of the children's television issue before the FCC.

The issue of protection from harm is not that children should be insulated from exposure to any and all advertising on television. Clearly, children always have and always will be exposed to advertising. The issue is whether children should be protected from being isolated as a specialized audience for the specific purpose of applying pinpoint and tailor-made advertising directed to their particular children's vulnerabilities. The point to be considered is not whether children should be permitted to observe and grow up in the television advertising game as played by adults. Rather, the question is, should children be protected from being singled out as the most vulnerable and maleable target for direct attack by television advertisers?

Similarly, it should be clear that the focus of concern is upon children and not the advertisers of children's products. The protection of children from direct advertising would require advertisers on children's programs to modify their advertising programs. It would not deny them the opportunity to advertise elsewhere, as do many producers of children's products.

On the programming aspect of children's television, the issue is not simply that there be some planned programming based solely on the needs and interests of children. We have already gone around commercial television to obtain some such services on public television. The point for consideration is whether the special public responsibilities of the commercial broadcasters and their enormous command over the viewing audiences of the nation warrants the development and implementation of a program of children's television designed to meet the needs and interests of children.

The special treatment of children has been clearly recognized in the law since time immemorial, and recently, by the television networks and the advertising industry. In a press release describing its Fall 1972 season offering for children, CBS stated: "Children. They are our most precious resource. When they are entertained creatively and instructed with great care and imagination, all of society benefits." The Association of National Advertisers, in formulating guidelines for commercials on television aimed at children, said it recognized that children are a special group of viewers and that television plays an important role in their development. The guidelines, adopted by the ANA July 6, 1972, are based on principles the advertisers' organization considers mandatory in communicating with children.

The pronouncements, of course, follow on the heels of the FCC Notice of Inquiry and Notice of Proposed Rulemaking which stated, on this point:

> . . . there are high public interest considerations involved in the use of television . . . in relation to a large and important segment of the audience, the Nation's children. The importance of this portion of the audience, and the character of material reaching it, are particularly great because its ideas and concepts are largely not yet crystallized and are therefore open to suggestion, and also because its members do not yet have the experience and judgment always to distinguish the real from the fanciful.*

Recognizing that children require special public interest consideration, it becomes apparent that children need protection from being singled out as a market and specifically manipulated in pinpoint fashion for the financial benefit of advertisers and broadcasters. Most of the claimed abuses of children's programming and advertising have arisen precisely because the industry has become increasingly efficient at specialization in children's programming and advertising. The segmentation of the child audience was created to permit a more direct

*Federal Communications Commission, "Notice of Inquiry and Notice of Proposed Rulemaking" Docket No. 19142, Jan. 29, 1971.

exploitation of the vulnerability of children. Thus, one cannot view the creation of new approaches to children's programming such as age-specific programming, as necessarily beneficial to children. If classifications are based upon considerations of profit and market exploitation as they usually are, one can almost certainly expect abuses to appear. In fact, the segregation of children's markets for advertiser exploitation may be much worse than having no children's programming classifications at all.

The positive side of the coin recognizes that there is a responsibility for creating classifications of children's programming on the basis of the needs and interest of children. That such classifications should be used on the commercial broadcast system, as opposed to the public system recognizes that public broadcasting has not fully met the special needs of children. It recognizes that the commercial system has much broader exposure to the public at large and vast numbers of children will be watching commercial broadcasting anyway. Most of the Nation has access to the commercial broadcast system and is well used to viewing the commercial channels, while only limited numbers of the population have access to the public broadcast system. Moreover, the commercial broadcaster has definite public service responsibilities which he cannot ignore nor leave for public broadcasting to assume.

The issue of children's television, then, comes down to: (1) ensuring that children are not singled out on the basis of advertising market criteria for pinpoint advertiser exploitation, and (2) ensuring that children are singled out for special programming on the basis of their own needs and interests. This, in turn, raises the crucial question: can these objectives really be met within the framework of an advertiser-based commercial broadcast system?

III A Forecast Under Existing Arrangements

Although children's television is currently an issue of high visibility on the public agenda, one is naturally led to question both the permanence of the problem and the durability of the active public that is taking interest. Now that the issues have been exposed, can we expect some self-correction within the next few years? Can we expect industry to realize that it must modify its private financial interest somewhat to reflect the public's interest by placing children's television higher up on its public interest order of priorities?

The nature of market development within the broadcasting industry would indicate that the trend toward specialization in children's programming, as well as other demographically determined specialized classifications, will not only continue but also will become much more sophisticated. Indeed, this is the way the market system is supposed to work. As the total market grows, it becomes economical and profitable to begin creating specialized market classifications that can be tailored more closely to the requirements of each classification of customers. Children's audiences represent such a classification which enables particular kinds of advertisers to get direct access to those audiences without having to go through the filter of a larger mass audience.

Television broadcasting is now just entering a phase of market development that will lead to substantially increased market specialization. In children's programming, this means the programs and advertisements will be more effective in exploiting the vulnerabilities of children in pinpoint fashion. Consequently, more complaints against its harmful effects can be expected. The greater the degree of market and submarket specialization in children's television, the greater the exploitation of children, and the more serious the public concerns will tend to be. If the public interest is identified with the prevention of pinpoint advertiser exploitation of children, then the continued pursuit of specialization of children's markets will be directly contrary to the public interest under the existing industry structure and regulation. Content diversification and age specificity, each important to children's interest groups, will be created, but the purpose will be to permit market exploitation. The children's classifications will be based upon the advertiser's interests rather than the child's.

Moreover, the economic realities of this trend make it unlikely that it will be easily modified by good intentions or self-regulation. The specialization era in children's television is just beginning and already has had an enormous payoff. The latest and most sophisticated information gathering and analytical techniques are already being employed for the purpose of identifying new, potentially profitable market segmentations. There is substantial evidence that continued market segmentation has a great future in children's television.

The substantial profitability from specialization in children's television virtually guarantees that the broadcast industry will follow this path. As time passes, the financial sacrifice that would accompany any decision to forego the specialization alternative will continue to increase, thus making it virtually inevitable that the broadcasters will pursue this path of development.

If the FCC elects to take no action on the children's television issues before it now, it appears inevitable that the presently operative economic forces in the industry will work to make the problems more serious, and bring on the day when they must be addressed. Yet, as time passes, it is likely that the profitability of children's shows will continue to increase, considerations of short term financial consequences will become more important, and the difficulties of coming to grips with the problem will become even greater. Hence, the time and circumstances for making public policy on children's television would seem to be better now than they will be in the future.

IV. The Range of Policy Options

In approaching public policy on the children's television issues, the FCC could limit its attention to the protection of children from abusive advertising and programming practices, or it could address the entire question, including the need for programming responsive to the needs and interests of children. Thus, the FCC could take a narrow view of its public interest responsibilities and simply address the issue of "potential harm" from advertising to children. Or it could address the issue of the public interest responsibility for affirmative standards for positive and constructive programming directed solely to the needs and interests of children. These issues, in turn, could be addressed in one of three basic ways: (1) encouragement of self-regulation within the industry; (2) FCC imposed regulations within the existing industry structure; or (3) FCC policy directed to resolving the issues outside the existing industrial structure.

Extension of the self-regulation approach would simply amount to exhortation to the industry that it do better. Self-regulation is supposed to exist already over a broad range of industry policies and practices. But all evidence indicates that it only works, if at all, for very short periods of time when no significant financial interests are at stake. The National Association of Broadcasters (NAB) is supposed to be a focal point of self-regulatory power within the industry, but it functions very poorly in this respect, providing no compulsory membership, no membership accountability, and no effective sanctions. Moreover, with the substantial financial and profit interests in children's programming, self-regulation in children's television would be doomed to failure before it began. An FCC decision to place hopes for improvement on self-regulation would result in no appreciable change in existing practices or priorities. Perhaps a one season well publicized flurry of activity would mark the zenith of the public policy issue before practices reverted to the trend.

Alternatively, the Commission might choose to impose standards designed only to protect the child audience from the undesirable aspects of children's programming and advertising. However, these rules would constrain broadcasters from fully exploiting their profit potential. Such rules would be running directly counter to the economic interest of the firm, and therefore subject to frequent violation. Moreover, it is doubtful whether the FCC could effectively police such standards.

In similar fashion, any FCC attempt to take affirmative action to enforce standards requiring a positive program of children's television directed to the child's interests would run directly counter to the economic interests of the broadcasters. It would also raise important problems of FCC monitoring and policing. The commercial economic incentives would remain; the broadcasters and networks would be fully aware of all financial opportunities that were being denied them; and the basic determinants of programming decisions would still be market considerations.

Finally, the Commission might remove children's television from the existing economic structure and the economic incentives of the industry by disallowing all advertising directed to selling products to children, i.e., all advertising except for institutional ads. This could prevent harm to child television audiences, but it may also prevent a sizable portion of children's television from being shown at all for lack of financial support. In like manner, a positive program for improvement of children's television would run into the same obstacle of devising a system of financial support to replace direct advertising revenues.

V. Removing Children's Television From the Commercial Market

The external financing option is the only alternative open to the Commission where it would not have to attempt to get the broadcasters to compromise, modify, or redirect their private pursuit of profit through sales of commercial advertising. Many analysts of the problem have concluded that it would be the most desirable alternative were it not for the accompanying financing problems which could mean a loss of existing levels of children's programming.

There are two fundamental concerns about external financing. The first is what the financial impact on the broadcasting industry would be from the loss in revenues, and the second is from where the sources of funds for program financing might come. In his recent study, FCC economist Alan Pearce looked briefly into these questions, concluding that within the existing structure of the industry, the revenue losses from children's programs would be substantial and that institutional advertising and underwriting seemed to provide no ready supply of financial resources to assume the costs of supplying children's programs.

A Financial Impact on the Existing Broadcast Structure

The financial impact of any major change on the existing broadcast industry depends largely on the time period over which that change would take place. When viewed in terms of instantaneous changes, consequences may be enormous. When viewed over a time horizon of planned change, the consequences are not only much less severe but also frequently what initially was feared as detrimental to a firm may ultimately turn out to be beneficial. A considerable part of the fear of the consequences of change stem from the relative uncertainty of change in comparison with the relative stability of existing arrangements.

It must be emphasized that the Pearce model simply performed static revenue calculations where the only change was the quantity of revenue lost from the removal of advertising from existing network children's television. Moreover, the model assumed that the change to external financing would take place instantaneously, thereby magnifying the consequence of the change upon network profitability. Pearce recognized that if demand elasticity, i.e., the response of advertisers to reduced supplies of advertising minutes and possibly higher advertising rates, was taken into consideration, the revenue consequences would have been much less severe.

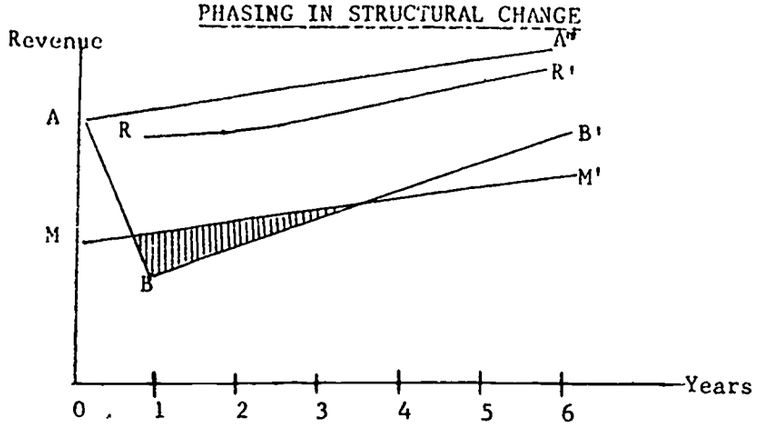
Adverse profit consequences would be minimized even further if all potential cost savings relating to promotion and sales were considered. Approximately 30 per cent of broadcast expenditures are for promotion and sales commissions. Most of these costs would disappear if children's television were taken out of the commercial market. Moreover, the networks have a unique capability to adjust their [illegible] to changes in revenue in order to maintain desired profit margins.[1] And when [illegible]nomic consequences of the passage of time are considered in the analysis, yea[illegible]year revenue growth and the opportunities for market adjustment become factors easing the revenue, cost and profit impacts of change. Experience would indicate that the profit consequences of removing advertising from children's television could be substantially mitigated by market adjustments.

However, what is most important is that the acceptable level of financial impact can be used as a benchmark for determining the necessary time period over which the change in financing methods can be phased in.

This is shown in the following illustration.

[1] See, e.g., Powers, R. and Oppenheim, J., "Is TV too Profitable?" *Columbia Journalism Review*, May/June, 1972, p. 10.

PHASING IN STRUCTURAL CHANGE



In the above illustration, point A represents total broadcast revenues for year "0", the year before a shift to external financing would take place. The curve A-A' represents the anticipated trend in revenues under existing institutional arrangements for supplying children's television. The M-M' curve represents the minimum revenue level that the FCC decides that the industry or individual firms must maintain to continue to operate at any predetermined level of financial health. If an instantaneous adjustment is made for the change to external financing, revenues would decline to point "B", which is below the "M" curve. On the basis of the instantaneous comparison it would appear that the change to external financing would be unfeasible and therefore an unacceptable alternative decision. However, if the change is implemented gradually over a period of several years, the annual impact in any one year is only a small fraction of its impact upon instantaneous adjustment. Thus, with a five year phase-in period actual revenues might become curve R-R' on illustration, substantially above the minimum acceptable revenues. Whether a phase-in period of five years, three years, or eight years is adopted is immaterial to the basic issue. What is crucial about this analysis is that the number of years can be varied in accordance with particular circumstances. Moreover, the phasing period can be contracted or extended on the basis of experience in the early phases. And it could be applied at the level of the industry or of the individual firm. It would be possible for example to apply different phase-in periods for different firms operating under different market circumstances.

Applying this type of analysis, the decision maker is seldom faced with the constraining alternative that the change to external financing cannot be accomplished because of economic reasons. If the decision makers conclude that advertising to children should not be permitted on commercial television, they can adjust the economic consequences to the affected firms over time by means of a phased strategy of implementation.

It must be recognized, of course, that the economic consequences of a change in the economic structure of children's television will affect more firms and industries than the broadcast networks and stations. Advertisers, agents, syndicators and producers would be affected also. But here again, the process of adjustment to the new financing arrangements can reflect a sufficient time period for transition. Clearly, these entities do not have financial interests as great as the networks and stations; for virtually all firms the financial impact can be expected to be relatively modest, especially when it is recognized that most firms have acceptable alternatives.

Although one could attempt to estimate the financial impact on each segment of the industry, the limitations of existing data and the infinite set of possible assumptions that would be used would tend to make the precision of such forecasts a focal point for debates on the children's television issue when they should not be. There will always be differences in the assessment of the economic impact upon different affected institutions. When it is recognized that the FCC can both develop a phased strategy for implementing change, and monitor actual changes and modify the rate of implementation of change as time passes, precise forecasts of consequences become irrelevant to the fundamental children's television issues.

Economic impact is a factor to be considered in the design of a program for policy implementation. It is not a factor that constrains the policy options available to the Commission.

B. ALTERNATIVE SOURCES OF FINANCING

Removing advertising from children's programming addresses the issue of protecting children from the harm of pinpoint advertising directed to children. However, an affirmative policy of developing a minimum quantity and quality of children's programming directed to meet the needs and interests of children requires consideration of the problem of alternative sources of financing. The potential alternative sources of financing must come from such sources as institutional advertising, underwriting or government. Here, too, forecasting the response of these institutions to the financial requirements of children's television is uncertain at best. The people directly involved who would have responsibility for influencing such decisions are hesitant to attempt to predict their reaction to the changed financial environment in children's television.

Whether external financing can be obtained for children's programming will remain a highly uncertain matter until it is attempted. Institutional advertising is a widespread practice by United States corporations, but only a small proportion of their advertising budgets are devoted to it at present. In children's television, Health Tex Inc, is the outstanding institutional advertiser, spending $1 million per year. Although the amounts of institutional advertising are gradually increasing over time, it is impossible to forecast the potential response of institutional advertising to children's television opportunities under a changed system of financing. Potential institutional advertisers point out that they may well be interested but their interest will depend upon the particular circumstances, the program, the prestige and other incentives that surround their support of quality children's programming.

Underwriting support for children's programs is in much the same position as institutional advertising. Although the amounts of program underwriting have been increasing in recent years, there is no reason to expect underwriters to assume responsibility for children's programming. However, it is reasonable to assume that underwriters would participate in the financing of children's television to a significant degree. The extent of their participation, however, is likely to be determined largely by the circumstances surrounding the new children's television operations. If it was prestigious and high quality, underwriter support could be fairly substantial.

The United States Department of Health, Education and Welfare (HEW) and other federal, state and local government agencies spend substantial amounts of resources on children's educational films annually. To the extent that children's programs under the new arrangement can satisfy the needs of these various agencies, as they should if they are directed to the needs of children, additional financing sources could be uncovered. But here too, one cannot forecast their potential participation with any degree of certainty because so much depends upon the nature of the children's television programming that evolves under the new arrangements. It is clear, however, that the potential for attracting financing from institutions, underwriters, government and other sources is there if the new program structure is established properly and inordinate demands for funds are not required immediately. The practical problem is whether the funding potential can be tested without making an irrevocable decision to alter the structure of children's television.

By adopting the phasing procedure outlined above for providing the required near term financial protection for broadcasters, a step plan can be devised to test the feasibility of phasing out advertiser financing of children's shows and phasing in sources of external financing. Although the phasing structure would be based upon a long run plan through complete conversion to external sources, the program could be established, at least initially, as an experimental one. The FCC could monitor developments at least through the initial stages to see if sufficient funding was forthcoming from external sources. If it was not, the Commission could slow down the rate of change to the new structure with a minimum of inconvenience for all parties. Moreover, the Commission is always free to review its policy at any time.

This experimental approach has a unique advantage in that it gives those who have been requesting alternative sources of financing an opportunity to come up with the resources. In the event that they do, the structure of children's television can be changed so as to respond directly to the interest of children. In the event that they cannot obtain sufficient financing from external sources, alternative attempts to remedy the existing problems in children's television could be pursued.

VI. A Plan for Conversion to Alternative Financing

The development of a plan for conversion to alternative financing arrangements for children's television must consider many interrelated factors. The annual rate of investment in children's programming depends upon the quantity of children's programs desired and the time period over which a library of quality children's programs is to be accumulated. The greater the quantity of new programs, and the shorter the time period over which they can be accumulated, the greater is the annual rate of investment required. Although one can set objectives for fund raising to achieve a given program inventory level, the inventory of children's programs will grow at the rate that funding is attracted.

However, it is important to recognize that there is an existing inventory of quality children's programs. We are not starting from scratch. Moreover, as we have previously noted, children's television in particular does not become outdated easily and the audience is continuously changing as children grow older. Thus, the same characteristics that make children's television economical under existing economic conditions can make it economical under a system of alternative financing. For example, age specific programming would be valuable for periodic reruns indefinitely. The fundamental difference would be that the programs and their many reruns would be programs designed for the needs and interests of children rather than advertisers.

An initial step in the implementation of an affirmative program for developing "quality" children's television would be an assessment of existing program materials and the classification of an inventory of acceptable programs. Such an assessment is required not only as part of a program for establishing quality children's television, but also as part of a program to protect children from the "harmful" characteristics, e.g., violence, of bad programming. As earlier chapters point out, some of what is generally acknowledged to be the worst kind of programming is shown as children's television simply because its rerun costs are very cheap. As funding is attracted for the production of new children's programs, the established inventory of "quality" programs would be increased.

Programming costs during the first several years under the new arrangements would be difficult to estimate because at least some development costs associated with the change in production arrangements would be involved. And even though the cost per showing may ultimately be lower than existing program costs, the financial resources for production are needed at the front end of the program cycle. As a point of reference, we know that existing commercial children's programs cost on the order of $125,000 per hour for program runs of about 20 half-hour individual segments. Children's Television Workshop produced *The Electric Company* at a cost, including all background research and preparation, of approximately $8 million for its first 160 half-hour shows, or $100,000 per hour. *Sesame Street* costs approximately $5 million for 160 one hour shows, or about $31,000 per hour.

If we use a liberal figure of $125,000 per hour as the upper extreme of what would be necessary for production in the first few years for program runs of about 30 hours per year, the annual program costs would run about $3.5-$4.0 million per hour of weekly children's television. However, if CTW's *Sesame Street* example is used as a more probable guide to costs, annual production costs would run only about $1 million per hour of weekly children's television. Thus, it seems clear that a program of alternative financing for children's television production could be established with a few million dollars to begin the first step in a phased program—the substitution of one hour of existing commercial children's programming with new non-commercial children's programming directed to the needs and interests of children. As more funds become available and additional programs are created, more hours can be substituted until the desired level and kinds of children's programming are achieved. Once this state of maturity of program development is reached, financing requirements will diminish somewhat as new programming needs are limited to the continuing replenishment and reinvigorating of an existing level of satisfactory programs.

In the supply of children's television, there are other costs in addition in programming that must be incurred. These are essentially network coordination, television signal transmission and broadcast station costs. Coordination of network distribution of non-commercial television is a function that could be very costly if it had to be especially performed for a few hours of children's programming. And it can readily be performed by the networks, as it is today, at minimum costs in their established system already devoted to continuous networking. In like manner, the costs of transmitting the television signal to broadcast stations would be minimized if the signals were delivered as part of the network's con-

tinuing broadcasting operations. Thus, performance of these functions could provide a contribution of the networks to the supply of children's programming under the new arrangements. The contribution of the broadcast stations would be the air time over which the programs were broadcast.

Both broadcast station and networks should be permitted or encouraged to contribute to the financing of programming. In fact, since children's television would no longer be a part of their public service responsibilities, financial contributions by stations might be encouraged or required as part of their public service responsibilities by the FCC. However, programming decisions must not be made by stations, networks or sponsoring financial contributors. An important part in implementing such a plan would be the development of a structure of separate decisionmaking entities to make programming decisions that reflect deliberation of the needs and interests of children under the new structure.

As a point of reference plan, a planning horizon of five to seven years could be adopted for the phasing out of advertising to children. Necessary lead times of six months to a year to establish a program under the new arrangements would be necessary. A four to eight step procedure for transition would permit gradual and controllable change. In the first step, one or two hours a week of children's programming without advertising could be introduced. Perhaps one hour of programming by each network for a national audience, and one hour of programming by local stations, drawing the programming from both new programming and the existing inventory of acceptable children's programming. Expansion of children's programming under the new arrangements could proceed as circumstances permit—primarily the rate of financing of new programs. This point of reference plan provides a manageable and reasonable transitional program. It can provide a foundation for the development of a more detailed actual plan for implementation of the policy objective, should the FCC decide that it is in the public interest to do so.

VII. Conclusion

The purpose of this chapter has been to develop a framework for addressing the issue of children's television. The issue has been narrowed to the purposes for which children are classified as special. They need protection from pinpoint advertiser exploitation. They require special programming directed to their needs and interests.

Under existing institutional arrangements for the support of commercial children's television, the presently operative economic forces in the industry will tend to make the problems of children's television worse. From the range of policy options available to the Federal Communications Commission, the external financing option has the greatest probability of success. A phased plan along the lines of the point of reference plan described above appears readily manageable and feasible. The details of an actual plan for implementation are, of course, subject to debate and modification. What is most important, however, is that the plan be a complete one designed to meet whatever objectives of children's programming that are specified by the FCC as a matter of policy.

FEDERAL COMMUNICATIONS COMMISSION ORAL HEARINGS ON CHILDREN'S TELEVISION

[Docket No. 19142]

January 8, 1973

Statement by Peggy Charren, President; and
Evelyn Sarson, Executive Director,
Action for Children's Television (ACT)

I am Peggy Charren, President of Action for Children's Television, and with me is Evelyn Sarson, ACT's Executive Director. We are here today representing many people who are missing from these Oral Arguments, people who have tried to make their voices heard at the FCC, who have tried to express their concerns about what television is doing to their own children, and who have urged the FCC to act in this small and specific area. These people are the viewers, the public, the mother at home with three children who turns on the television at five o'clock in the afternoon to find her local station is running horror cartoons interrupted by children's commercials. It is the teacher in the classroom who has to deal with the questions and fears of pre-schoolers who have seen stereotypes, monsters and murder in the children's programs they watch. And it is the conscientious parents who select a children's TV special for their children to watch—only to find it on at 8 or even later in the evening and ending long past the children's bedtime. And we are here today to speak for the thousands of parents who ask how often they should be expected to have to say "No" to the repeated demands for over-priced TV toys which they don't want to buy and the over-sugared foods advertised to children on TV which they don't want their families to eat.

We cannot bring the 100,000 individuals and groups who wrote to the FCC on ACT's petition to these hearings to tell you personally what they feel. We have, however, two additional indications of the incredible public concern over this issue of major importance in the lives of children growing up in America today.

The first is that many national organizations concerned with children have asked to participate in these hearings. The American Academy of Pediatrics and the National Conference of Christians and Jews have submitted statements. The American Group Psychotherapy Association, an organization of 2600 mental health professionals, sent the following letter from Jay W. Fidler, M.D., President, to the FCC on December 13, 1972:

> Gentlemen: The American Group Psychotherapy Association is composed of 2600 licensed psychiatrists, psychologists, psychiatric social workers and other mental health professionals. As a group, we are interested in adoption of the following rules and guidelines to govern all television programs for children:
>
> 1. There shall be no sponsorship and no commercials on children's programs.
> 2. No performer shall be permitted to use or mention products, services or stores during children's programs.
> 3. Each station shall provide daily programming for children (in each of the age groups—2 to 5, 6 to 9, and 10 to 12) no less than 14 hours a week, as part of its public service requirement.
> 4. There should be established a national understanding that children are not purchasers, that they do not have the experience to contend with commercials, that they should not be used to pressure their parents into buying, and that what children watch is the joint responsibility of parents and broadcasters.
>
> Sincerely yours,
>
> Jay W. Fidler, M.D.,
> *AGPA President.*

The Children's Service Division of the American Library Association representing 30,000 individuals, has asked us to read the following statement:

To: Federal Communications Commission.

Since we filed a statement in March 1971 we have heard from more and more of our members regarding the low quality of television programming for children. There has been little, if any, improvement and our association, with a membership of more than 30,000, continues to be concerned. We urge the Federal Communications Commission to take positive action *for children now.*

We respectfully suggest that the time has come for the Commission to consider statements representing the views of many citizens as well as those of the broadcasting industry and commercial interests.

We resubmit the original statement and reaffirm its theses.

CHILDREN'S SERVICES DIVISION,
American Library Association.

In a letter to ACT, the Family Service Association of America, New York, states: "We certainly will continue to support in every way possible the important cause you are forwarding to establish standards for children's television . . . Every good wish for substantial progress toward your goals at the hearings. We will appreciate your keeping us advised of your efforts and let us know when our support might be helpful in the future."

The most recent indication of public concern was the overwhelming response to a quiz in a national magazine. On December 3, 1972, Parade Magazine and ACT published a quiz on children's television. The first part was designed for parents to test their knowledge of children's TV; the second part offered readers a chance to "Speak Out" on children's television. To date, ACT has received almost 23,000 responses to the questionnaire. These will be statistically analyzed by a research team from Boston University, headed by Dr. F. Earle Barcus, Professor of Communication Research. As you can see from the quiz, several of the questions were factual. But the last questions invited readers to speak freely—and they did. ACT received long letters covering several pages, short typed notes, carefully thought-out statements, postcards and notecards. People covered every corner of their quiz forms on occasions to make sure that their voice would be heard. Several wrote across the top of the quiz, "Thank you for giving me the opportunity to speak out."

An accurate analysis of the complete quiz will be published in *Parade* magazine, which is distributed in 101 newspapers across the country. We have their permission to read to you some of the statements submitted as an indication of the degree of concern of a cross-section of the public. Here are just a few quotes.

From the mother of a 1- and a 5-year-old in Oregon:

With the exception of a few excellent programs on non-commercial stations, children can only absorb and then buy, buy, buy. If we are to improve the quality of life in this country, it must begin with quality education and entertainment for our children.

From the mother of a 5-year-old in Maryland:

I feel children's TV at present does not give any assistance to a child in living in today's world as a kind, intelligent, well-informed, articulate, functioning contributor to the human race.

From a mother of 5 children in Washington:

Luxuries seem like necessities to them. Selfishness and meanness to each other echo what they see on TV.

From a mother of two in Missouri:

We are concerned with the excess of violence in the children's cartoons and the terrible selling promotions that bombard children during their programs.

And from a parent in Arizona:

The most difficult thing from a mother's point of view, is trying to give a convincing reason for why we can't buy things that are advertised on TV.

From the mother of a 3-year-old in Illinois:

> If Sesame Street has such a powerful positive influence on children, I can't help but believe a steady diet of violence and other undesirable TV activity would also have a deep influence on them.

And from Washington, D.C.:

> It has made my three-year-old daughter into a three-year-old consumer.

From parents of a three- and a seven-year-old in Arizona:

> Public TV is a Godsend. Commercial TV rates the mighty dollar much higher than this nation's children.

A quote from a Washington, D.C. mother:

> The sad thing is that the FCC has been so unresponsive for so long to complaints about children's programming . . . One has the feeling that it is a Commission composed of commercial television interests and not for the public.

And both parents of a 4- and an 8-year-old said in their response:

> The problem with this quiz is that only concerned parents will answer it and their children are the ones you have to worry least about.

Television critics have written of the outrage of children's television; thousands of parents have voiced their concern; and major organizations with memberships in the multimillions have demanded change. And what has been the response of the broadcasters?

Well, the National Association of Broadcasters has met to consider the problem and has brought forth, with considerable fanfare, their solutions: the maximum number of commercial minutes on children's television programs from 7 a.m. to 2 p.m. on Saturday and Sunday has been cut from 16 minutes to 12 minutes, as of January 5, 1973. Even as a first step (and there is no indication that the NAB considers this cut a first step) this change is minimal. Where is the protection of the child on Monday through Friday? Why, when the NAB sets up Saturday and Sunday morning as "prime time" for children, do they permit two and a half minutes *more* per hour of commercials than they allow for adult prime time? What a strange way for the NAB to solve the problem of over-commercialism on children's television: Their new rules seem to help the clutter-conscious advertiser more than the child.

The NAB has also ruled that hosts on children's programs shall not sell. This is commendable . . . indeed it is part of the Rule Making we are considering here today. But who will make sure that Code stations adhere to this rule? And will the 40% of TV stations which do not belong to the Code also stop host-selling on children's programs?

It should also be pointed out that misleading advertising to children hurts low-income families far more than others. In a pilot study by Daniel Yankelovich Incorporated on "Mothers' Attitudes Toward Children's Television Programs and Commercials," a group of mothers in Denver, Colorado, discussing this problem, agreed that the toy manufacturers make Christmas time unbearable for them. One mother stated that commercials: ". . . give children a purchasing power they shouldn't have. Many times they make the parents feel guilty . . ." [1]

In a letter recently sent to the Commission in reference to this docket, Representative Patsy Mink of Hawaii clearly expresses the concerns of those who care about children.

> The first rule is the most important. It states, "There shall be no sponsorship and no commercials on children's programs." To me, this is a fundamental moral issue and should be decided not on economies but on principles of social responsibility.
>
> Our entire broadcast license system is based on the fact that those who utilize the limited facilities of broadcast communication owe a responsibility to the general public. There is no more important a segment of the public than children, insofar as the impact—for better, or worse—of broadcasting, particularly where television is concerned.

[1] Yankelovich, Daniel. "Mothers' Attitudes Toward Children's Television Programs and Commercials," p. 53.

[Science, Vol. 173, No. 4003, Sept. 24, 1971]

DENTAL CARIES—PROSPECTS FOR PREVENTION

Combined Utilization of Available and Imminent Measures Should Largely Prevent This Ubiquitous Disease

By Henry W. Scherp *

Dental caries is localized, progressive decay of the teeth, initiated by demineralization of the outer surface of the tooth due to organic acids produced locally by bacteria that ferment deposits of dietary carbohydrates. With progressive loss of tooth mineral and secondary destruction of tooth protein by continued bacterial action, cavities form which, if untreated, extend and destroy most of the tooth, often leading to serious infection of the surrounding tissues. Almost everyone in the United States experiences dental caries to some degree, mostly before adulthood. This disease is the leading cause of lost teeth before age 35, when chronic progressive destructive periodontitis (pyorrhea) begins to supervene. Though not ordinarily considered to be endangering to life, these two diseases are among the most prevalent and troublesome afflictions of man. Both are consequences of selective colonization of tooth surfaces by bacteria indigenous to the oral cavity.

During the past decade, dental caries research has experienced an impressive resurgence on a broad front, catalyzed primarily by experimental substantiation of the concept that caries results from one or more transmissible infections.

Specifically, caries results from colonization of vulnerable surfaces of the teeth by a characteristic group of bacteria, harbored by many members of a susceptible host species and transmitted from them to previously uninfected members of the same species. These bacteria ferment dietary carbohydrates in situ, principally to lactic acid which, at susceptible sites, initiates the carious lesion by demineralizing the enamel surface. In particular, the predominant group of cariogenic bacteria identified until now can metabolize sucrose in a peculiar way, producing extracellularly an adhesive polysaccharide (dextran) from the glucose moiety, and mainly lactic acid from the fructose moiety. Typically, these bacteria also store intracellular polysaccharide (amylopectin) during periods of environmental carbohydrate abundance and utilize it with the formulation of lactic acid during periods of environmental carbohydrate deficiency. The development of caries requires critical relationships between tooth surface, oral microbiota, and dietary carbohydrate. The logical approach to control, therefore, is to modify one or more of the three factors in this host-parasite-environment complex.

Yet despite the advances in our understanding of its pathogenesis, caries continues to be a major public health problem. In the United States, nearly everyone sooner or later develops some caries; it has been estimated that we now spend about $2 billion annually to repair the resultant damage. Even so, we obviously meet only a minor fraction of the need. Since caries is principally a disease of young people, recent experience of the U.S. Army gives a representative picture of the problem. Army surveys indicate that every 100 inductees require 600 fillings, 112 extractions, 40 bridges, 21 crowns, 18 partial dentures, and one full denture. To repair completely the damage caused by caries nationwide would cost an estimated $8 billion more annually than we now spend.

On the other hand, review of the caries research accomplished warrants expectation that we could greatly speed amelioration of such deplorable statistics by a concerted effort to apply existing knowledge, to develop established leads,

* The author is special assistant to the director, National Institute of Dental Research, Bethesda, Md., 20014, for National Caries Program.

> Children are uniquely vulnerable to adverse effect of televised programming, yet at the same time they are singularly open to positive benefits from proper programming. We must therefore be doubly cautious in our regulations governing this aspect of licensee performance.
>
> Despite efforts by advertisers to avoid adverse effects, proposed Rule Number 1 should be adopted. The basic principle of attempting to sell commercial products by influencing young children is wrong in concept. No matter how cleverly or skillfully presented, advertisements are intended for a purpose that is incompatible with the needs of children at an early stage in their development.

And what is being aired on children's TV programs this year? Some innovative shows are on. ABC is airing a once-a-month after-school special in the afternoon, CBS has been running children's news specials and NBC originated a daily half-hour pre-school program which will now be aired on weekends only. Some local programs provide diversity, and limit or cluster commercials. But these are the exceptions. ACT has monitored the network season and asked its contacts around the country to watch as well. Disappointment at the low calibre of the programming and anger at the incredible barrage of selling has been the general response. Writing in *Variety*, Bill Greeley described the 1972-73 children's TV season as "almost unanimously witless, heartless, charmless, tasteless and artless." Ron Powers of the *Chicago Sun Times* described the new network schedule as "a giant step backwards." And many independent and UHF stations are still running the violent super-hero cartoons removed from network TV because of the public outcry. In a full color ad in last month's "Broadcasting" magazine, Warner Bros. Television advertises:

> SUPERMAN/BATMAN/AQUAMAN IN ANIMATION
>
> On the CBS Television Network, over a period of four seasons, 69 episodes of super-hero animation dominated their time periods with impressive ratings. These exciting episodes include THE NEW ADVENTURES OF SUPERMAN (34 half-hours), AQUAMAN (18 half-hours) and THE NEW ADVENTURES OF BATMAN (17 half-hours).[2]

Warner Brothers does not seem to believe that self-regulation will change much. The National Association for Better Broadcasting, which publishes an annual "Guide to TV Viewing" for parents, described "Superman cartoons" now in syndication as: "Disgraceful and irresponsible fare for the world's youngsters. Threadbare plots, unsuitable values. Children deserve better. First aired on CBS."

The Association of National Advertisers, which will be speaking here tomorrow, has adopted Children's Television Advertising Guidelines. As an indication of just how seriously the ANA meant these guidelines to be taken, they neglected to put in any mechanism for enforcement. There are no penalties for any kind of infractions, nor are any checking or monitoring procedures suggested to ensure that advertisers adhere to the guidelines.

Many broadcasters have said to us that while they agree that it may be undesirable to sell to children, without commercials they would be unable to air any children's programs. ACT commissioned Dr. William Melody to examine alternative methods of funding children's television programs on commercial television. In conjunction with the release of his study, "Children's Television: Economics and Public Policy," Dr. Melody stated last week that children's television programs on commercial television could be aired with no commercials in five to seven years, without financial hardships for broadcasters. According to Dr. Melody's study, while last spring's study by Dr. Allan Pearce of the FCC concluded that ACT's proposal to eliminate children's commercials would result in a serious financial loss to all three networks, the Pearce study did not consider changes in the existing broadcast structure for children's programming.

Dr. Melody states that:

> "When it is recognized that institutional change does not have to take place instantaneously with cataclysmic economic consequences, it becomes clear that policy makers can phase in the new policy at whatever rate they find most compatible with the public interest. Thus, whatever economic constraints exist, they become factors that modify the speed of change and not factors that preclude the feasibility of change."

[2] "Broadcasting" Dec. 4, 1972.

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Dr. Melody's study points out that during the early years of television, nearly half of the combined network offerings for children were presented without commercials. In 1949, for example, 42% of children's programs were aired without advertising sponsorship. Today, program decisions are made on the basis of which programs will attract the largest share of the audience available during specific hours. According to Dr. Melody, children's television is broadcast not when it is most convenient for children or when the largest children's audience would be attracted, but rather when children's television provides the greatest commercial advantage over alternative programs at that time.

ACT, as you well know, has proposed that children's television be regarded as a public service area, to be shown without commercials. Many commercial stations do not agree with this philosophy. Yet, in the past three years, an increasing number of commercial stations have been airing five hours a week of children's programming without commercials, without any sponsorship, and at times when many children are watching. To date, a total of about 50 commercial stations in areas such as Bismark, North Dakota and Amarillo, Texas have been enthusiastically airing five hours a week of quality children's programming without commercials. These are the stations that have managed to persuade the Children's Television Workshop to let them air the pre-school program "Sesame Street" daily on a commercial station in an area where there is no public television station. The Children's Television Workshop has a strict contract for the program which ensures: (1) no commercials or sponsorship within or adjacent to the program; only noncommercial announcements are permitted; (2) underwriting credits can be only a simple statement without descriptive comments. Underwriting is permitted by CTW and a station may use a phrase such as "Sesame Street was brought to you this morning as a public service by Smith's Store."

In a conversation with a representative of WBRZ–TV, a commercial station in Baton Rouge, Louisiana, the following became evident. The station airs Sesame Street from 9 to 10 a.m. Monday through Friday, 52 weeks a year, without any commercials. The air time is contributed by the station. The station pays about $50.00 a program plus $10.00 mailing fee. Since November 23, 1970, WBRZ has been airing the program, which is getting good ratings. WFMJ–TV in Youngstown, Ohio, has been airing Sesame Street, Monday through Friday, since November, 1970, when the program first went on the air. It is aired 52 weeks a year, from 9:30 to 10:30 a.m. and since the station is a UHF, their rates are lower than those of the Baton Rouge station, totaling some $12,000 a year. The station estimates the cost of the air time donated to the program is about $250.00 an hour of Class C time or $1,250.00 a week. The station receives no contribution towards the cost of the program from any underwriter and the ratings show a substantial audience of young children.

One stipulation of the CTW contract with stations is that if a public TV station opens in an area, "Sesame Street" is automatically transferred to the public TV station.

In many cases, stations do not run any other children's programming and do not have funds or facilities for developing children's programs. One program manager said: "It's difficult for a local station to invest large sums of money in children's programming—certainly it costs us less to buy "Sesame Street" from CTW than to produce an hour a day of our own children's programs. I feel it's best for the money for children's TV to go to one central place where the program can be produced with the right kind of research and the top quality people making it so that you know it's going to be a good product. We just don't have those kind of facilities locally."

Dr. Melody's study and the experience of Children's Television Workshop with commercial stations have proved that what ACT is asking for is possible.

It is possible for a commercial TV station to run children's programming without commercials.

It is possible to attract a sizeable audience for quality children's programs.

It is possible to phase in a new policy for children's television at a rate compatible with the public interest and the broadcaster's interest.

And it is possible to change children's television from an area of major concern in this country to a creative force in the lives of children.

The responsibility for regulatory action rests with you, Chairman Dean Burch, Mr. Benjamin Hooks, Mr. Nicholas Johnson, Mr. Robert Lee, Mr. H. Rex Lee, Mrs. Charlotte Reid, and Mr. Richard Wiley.

NEWSPAPER ARTICLES

[Miami (Florida) Herald, Sept. 15, 1972]

NEW SEASON'S "KID SHOWS" TAKE GIANT STEP—BACKWARDS

By Ron Powers

Saturday-morning television programming for children has taken a giant step backward this year. And the backsliding occurred just a season after things had started to look so promising.

In 1971, spurred by the activism of Action for Children's Television, the success of Public-TV's Sesame Street, increased pressure from the critics and by ominous rumblings from the Federal Communications Commission itself, the three networks significantly upgraded the quality of children's programs.

Knowledge-oriented shows, featuring real people, began to replace the cheap-slick formula chase cartoons. ABC's Curiosity Shop, NBC's Take a Giant Step and Mr. Wizard, CBS' You are There and In The News—all of these contributed to heightened value for small viewers on Saturday mornings. The ruthlessness of hard-sell cereal and toy commercials was checked, and everyone glowed.

But television's impulses for voluntary public-spiritedness last about as long as a child's attention span.

Ratings—which the networks swore did not influence their commitment to the new, experimental shows—apparently have brought us all back to earth.

The new children's season is business as usual at the crowd-catching cash register.

Five of the six new NBC programs are cartoons. (A sixth animated show, Underdog, returns to the air after several years' absence, and NBC has changed the title of the live Take a Giant Step to Talking With a Giant.)

All five of CBS's new offerings are cartoons—though one of them, Fat Albert and the Cosby Kids (11:30 a.m.), features appearances by Bill Cosby, who emphasizes a learning point in the show. All four of ABC's new shows are animated.

Undeniably, the violence level is far below what it was a couple of seasons ago in the new cartoons, and many of them make passing attempts to distribute shorthand enlightenment. NBC's Sealab 2020, for instance, will tell your kid how long it will take him to decompress after a deep-sea dive, and ABC's Kid Power deals with prejudice in ethnic neighborhoods.

But basically the new shows are slick entertainment wrapped around flashy toy and cereal ads, and are a poor substitute for just about anything a young child might elect to do on his own.

There is one new kids' show, however, that stands below all this. For sheer audacity in dragging the stylized avarice and frenzied greed of adult game shows into the realm of children, it deserves a special pedestal in the dustbin of the medium's most shameless enterprises.

It is called Runaround, it is on at 10:30 on NBC, and you probably should watch it once just to see how far television is willing to indulge its own fascination with materialism.

The host is Paul Winchell, the ventriloquist, and the contestants and live audience are all children. At the start of the program the nine contestants come, charging out to their places as their names are called, brandishing both fists over their heads like a Lilliputian horde of hopped-up pillagers.

The familiar gameshow organ reaches a crescendo in the background, and Winchell, twitching his black mustache gleefully, bleats: "Are you all ready to play Runaround?" "Yaaaaaaaaah," the combatants scream.

"I'm glad to see such enthusiasm," Winchell oozes, "because we have some great prizes for everyone."

The idea is that Winchell asks a question that has three possible answers. At a signal, the nine kids go racing across the floor to stand in front of a number that corresponds to their choice for the correct answer.

But the road to consumer-success isn't that easy, as the young recruits soon find out: to enjoy most fully the fruits of greediness, one must learn to use duplicity and deceit against one's rivals.

So the contestants are told that they may at first stand in front of a WRONG number, to confuse their adversaries, until Winchell clicks his little clicker. Then

the nine must scramble for what they consider the right number: the slow ones are punished by banishment to a "Penalty Box," which also serves as incarceration for those who give incorrect answers.

NBC says the show is "informative," but I saw one kid win an Electrophonic stereo and a bicycle simply because he ventured a wild guess on a "tie-breaker" question ("How much is fourscore and seven?") and happened to come closer ("20?") than his opponent ("11?").

Runaround is the logical extension of the fantasy-gratifying toy commercial. It doesn't belong on the air.

[The New York Times, Oct. 22, 1972]

BATTLE OF THE BREAKFAST TABLE

Stakes Big, So Cereal Producers Pour It On

By Philip H. Dougherty

Any mother with one or more of the gimme group at home can attest to the power of dry-cereal advertising. But it's getting harder to understand just what the kids are yelling "gimme" for.

How can a member of the Corn Flakes generation be expected to understand demands for such things as Freakies, Baron Von Redberry and Sir Grapefellow, Froot Loops, Pebbles and Count Chocula and Franken-Berry ("the monstrously delicious cereals")?

Where do youngsters learn about such things? Well, on a recent Saturday morning, an estimated 25 million kids were watching network television. And network television is where the four major cereal manufacturers put some $45-million worth of advertising last year.

What did all those children see and hear? They saw a lot of crazy cartoon characters, for one thing, and they heard a lot about crunchiness (apparently a vital ingredient for cereals) and they also heard many references to "eight essential vitamins."

"So crispy, you almost have to eat them with your fingers in your ears," is the message for Ralston Purina's Chex cereals.

"Tastes like a bowl of noisy fruit," says the spot for Pebbles, made by General Foods' Post division.

"A frootful snootful," promises the commercial for Kellogg's Froot Loops.

Kids also learn of orange, pink and purple breakfast delights, of some that taste like peanut butter and of some that are sprinkled with marshmallows. And, perhaps more important to them, the kids learn that a box of Pebbles might contain a Toy Pelican Powered Flintmoboat. And they discover, for 75 cents and a "purchase seal" from General Mills' Trix, they can get a Wham-O 27 color pencil.

Almost sounds like a fairy tale—but it adds up to $800-million in annual sales of ready-to-eat cereal. A fairy tale should have some trolls, and there are trolls aplenty:

Those at the Federal Trade Commission who have charged the big four cereal makers with monopolistic practices.

Those of Action on Children's Television who would like to eliminate advertising aimed at children.

Those who want to use TV to educate tots on the nature of advertising and nutrition.

And those who are making the "instant breakfast" and pop-out-of-the-toaster goodies that are cutting into the cereal market.

The cereals with the strange names, bright colors and flavors are of the pre-sweetened variety. This is not the biggest category of ready-to-eat cereal, but certainly it is the fastest growing and now accounts for 30 percent of the market.

According to John C. Maxwell Jr., an analyst for Oppenheimer & Co., the only one of the big four manufacturers—Kellogg, General Mills, General Foods and Quaker Oats—that gained in dollar volume last year was General Mills, which has created the wackiest names for its new brands. Kellogg showed a gain in units sold.

People in the cereal industry say that premiums are being used as persuaders more than ever before. They also say that more than one manufacturer would like to get out of this rat race but can't because of competitive pressure.

"When you have two or three brands on the shelf that are all equal, then what is going to pull one off the shelf? Premiums. That's what is going to charge up the kid."

He noted that price competition is rarely used for cereals because money is no object to juvenile consumers. (Why should it be? It isn't theirs.)

The nation devours more than one billion pounds of ready-to-eat cereals a year. One industry source says 70 percent of this is gobbled up by people under 20 years old. A more sophisticated source breaks it down to 38 percent by the under-13 set and 31 percent each by the 14-to-44 and 45-and-over groups.

Cereals are pre-sold with advertising and are given a push on the crowded supermarket shelves by colorful packaging (front and back.) But premiums have become a primary ingredient in the marketing mix.

Although the fortified brands are expected to be a growth area for cereal manufacturers, the biggest expansion last year was in the pre-sweetened category.

Why has the pre-sweetened segment grown? Maybe Mrs. Peggy Charren, president of the 15,000-member, Boston-based Action on Children's Television, has the answer.

"Children's television has changed the design of products," she said the other day.

Before television, new cereal products tended to flop on their faces. But since 1950 about 150 new brands have been introduced.

Saturday morning TV time is cheap compared with prime time. It is the difference between $4,000 for 30 seconds and $30,000. So a cereal maker can launch a new, crunchy, pre-sweetened brand with about $2-million for advertising plus $1-million for premiums.

Curiously, what seems to have given the whole business a boost is the July, 1970, blast by Robert B. Choate, a former Nixon Administration consultant on hunger. His charge that most cereals had little nutritional value made headlines coast to coast.

He ranked 60 brands in descending order of nutritional value. Kellogg's Corn Flakes, Rice Krispies and Sugar Frosted Flakes (which he ranked 38th, 39th and 58th) were last year's first, third and fourth best sellers, in terms of units. General Mills' Cheerios (which he put in 25th place) sold second best.

The only explanation Mr. Maxwell had to offer was: "It's the same as tobacco. Tell them it's not good for them and they'll buy it. People love to sin."

Mr. Choate said recently that sales did drop during the first six months after his disclosure. He noted that, of the 40 brands that got the worst marks, 36 have stepped up their nutritional content.

He, by the way, is not out to eliminate advertising on children's shows. But he would like to see public-service spots educating children as to just what advertising is.

Although Mrs. Charren says ACT has found little improvement in the new TV season, a glance at some of the new commercials indicates that advertisers are moving in a direction that may please some of the critics.

In a recent speech Mrs. Virginia H. Knauer, special assistant to the President for consumer affairs, complained: "In all the crunchy, crackly, yummy, chewy, colorful foods paraded before children's eyes, where are the meat and potatoes, the fruits and vegetables, the eggs and milk that should be the staples of their diet? Sweetness becomes a cardinal virtue in food products—a virtue totally out of proportion to sugar's place in the diet."

More than one of the new commercials show the advertised cereal along with bacon and eggs, orange juice and toast. Or they include voice-over lines like "good breakfast *featuring* Post Super Sugar Crisp."

Mrs. Knauer is not alone in attacking sweets-stressing advertising. The FTC issued similar criticism last January when it accused the big four of running an illegal monopoly (created in part by their tremendous advertising budgets) that forced consumers to pay "artificially inflated prices."

Not so, said Yale Brozen, a University of Chicago business economist and one-time consultant to the cereal industry. Instead of damning the cereal makers, he said, the FTC should be praising them because their TV advertising has made dry cereal a year-round favorite, smoothing out consumption patterns and lowering costs.

[Parade, Sunday, Mar. 4, 1973]

WHAT YOU THINK OF CHILDREN'S TV

By Herbert Kupferberg

"My child loves TV," writes the mother of a 4-year-old in Lewiston, Idaho. "It is his friend. It is sad for his friend to betray him and show him things that make him afraid to sleep at night."

Her comment typifies the overwhelming concern about children's television felt by U.S. parents, as expressed in a vast outpouring of responses to a quiz jointly sponsored by "Parade" and Action for Children's Television (ACT), which appeared in this magazine's December 3 issue.

More than 25,000 replies have been received to the questionnaire at ACT headquarters at 46 Austin St., Newtonville, Mass., and at this writing they are still arriving at the rate of 20–40 daily. They come from every State of the Union and Canada. Many of them are accompanied by long letters from concerned mothers—and some fathers, as well—complaining about a broad spectrum of children's TV practices ranging from excessive violence to incessant commercials.

The quiz responses have been computerized and analyzed by a team of Boston University experts under the direction of Dr. F. Earle Barcus, professor of communication research.

Comments Dr. Barcus: "There are a lot of concerned parents out there who cared enough to send this quiz in. There was a great response from upper-middle-class mothers, as well as from other groups. This is a concern that seems to affect all income levels and all parts of the country."

One of the quiz's most startling discoveries is the extent to which the Public Broadcasting Service's noncommercial children's TV programs have captured a nationwide young audience. PBS programs are normally not included in the Nielsen and other TV ratings. But parents answering the question "Which programs does your child watch most often?" named "Sesame Street," "The Electric Company," and "Mr. Rogers' Neighborhood" in 1–2–3 order. A fourth PBS offering, "Zoom," placed No. 11. Many of the commercial programs most frequently named were not children's programs at all, but regular adult or family-type offerings. A list of the top 20 programs appears at the end of this article.

21 Hours a Week

Among other findings are:

The average child watches television 3 hours each weekday, 3.5 hours on Saturday, and 2.3 hours Sunday—a total of around 21 hours a week.

Parents are overwhelmingly opposed to the current frequency of commercials on children's TV programs. Nearly 40 percent voted for a policy of no commercials, 23 percent for fewer commercials, 25 percent for commercials only at the beginning and end of a program, and 7 percent for various combinations of the foregoing. Only 4 percent favored "no change in the present system" and 1 percent did not answer the question. "This was one of the biggest surprises," comments Dr. Barcus. "I expected a lot more people to support the present system."

By far the most frequent complaint voiced by parents was about violence, with 32 percent objecting to its frequency. Nearly 10 percent complained about the content of cartoon programs, and many parents protested the prevalence of "monsters" on their screens. "My son wakes up at night talking about monsters he's seen on TV," writes the mother of a 2½-year-old in Detroit. "Is cruelty, murder, mayhem, sadism the best the networks can do?" asks another woman in Yakima, Wash.

Despite these and other objections, most parents give a high rating to the programs their children see most often, with 40 percent describing them as "excellent," 41 percent "good," 14 percent "fair" and 3 percent "poor." Dr. Barcus explains this seeming paradox by pointing out that most parents answering this question were alluding to one or more Public Broadcasting Service programs. "If we took away the PBS programs and one or two others, the results would be overwhelmingly negative," he says.

As another result of the PBS shows, 71 percent of the respondents think TV has a good influence on their children, and 41 percent bad (the total of more than 100 percent is accounted for by responses indicating both good and bad). Asked whether there were enough programs in their area specifically designed for children, 35 percent answered "yes" and 61 percent "no," with the rest undecided or not answering.

The quiz attracted the attention not only of parents, but of teachers, clergymen, civic leaders, college students, teen-agers, and children themselves. Many in their comments voiced regret that greater use wasn't being made of TV's potential. "The programs are fairly harmless but don't do much to stimulate the mind," wrote an Illinois mother of five. "TV is a marvelous vehicle for instruction but has been wasted on inanities," says a mother of two in New York.

On the other side, a North Dakotan with three youngsters comments that her children "are much more informed on good things that we never even knew existed

when we were children." Says a South Carolina mother, one of the few who voted for no change in the present system of commercials. "TV keeps my children entertained, and I know their whereabouts."

Cookie Monster as Model

A few parents voiced complaints about "Sesame Street," on the grounds that it was aimed primarily at urban ghetto children rather than the general middle class, and that its use of slang was questionable. "My child eats like the Cookie Monster, and this upsets me," wrote the Pennsylvania mother of a 3-year-old, alluding to one of "Sesame Street's" most popular puppet characters.

Teachers in a number of junior high and elementary schools, who assigned the Parade-ACT quiz as a class assignment, found pupils' replies surprisingly parallel to those sent in by adults. "There's too much violence on TV—my younger brother keeps hitting me," reports an 11-year-old in the Republican School in California, Pa. "There are more commercials than programs," adds a 9-year-old classmate.

"I care about the children I babysit for," comments a girl at the St. Christopher-School in Midlothian, Ill. "Programs with violence aren't good for little kids 5 to 11 because they don't need that kind of education." Children at the school named "Sesame Street" as their favorite program by a wide margin.

"Clear Mandate" Seen

In making his evaluation of the results, Dr. Bareus acknowledges that the people most likely to answer the quiz are the ones most concerned with children's TV. Nevertheless, he says he was impressed with the "intensity, articulateness, and above all the great numbers and geographic spread" of the response.

Officials of ACT, which will later publish a detailed report of Dr. Bareus' findings, react similarly.

"We always knew there was concern," comments ACT's president, Peggy Charren. "But the degree of that concern as divulged by the Parade quiz, surprised us."

Adds ACT's executive director, Evelyn Sarson: "We think the results constitute a clear mandate to change what is now going on in children's television."

THE TOP 20

A total of 6,961 different programs were listed in answer to the question "Which programs does your child watch most often (list up to five)?" Following are the 20 most frequently named, with the percentage of respondents listing them.

Program	*Percentage*
1. Sesame Street	62.4
2. Electric Company	40.6
3. Mr. Rogers' Neighborhood	36.2
4. Captain Kangaroo	22.8
5. Walt Disney Presents	20.6
6. Flintstones	18.6
7. Brady Bunch	14.1
8. Partridge Family	10.0
9. Lassie	8.3
10. Gilligan's Island	8.0
11. Zoom!	6.8
12. Speed Racer	6.6
13. Romper Room	6.2
14. Wild Kingdom	6.2
15. New Zoo Revue	6.1
16. I Dream of Jeannie	5.9
17. The Waltons	4.8
18. Emergency	4.5
19. I Love Lucy	4.5
20. Mouse Factory	4.5

NUTRITION EDUCATION—1973

HEARINGS

BEFORE THE

SELECT COMMITTEE ON NUTRITION AND HUMAN NEEDS

OF THE

UNITED STATES SENATE

NINETY-THIRD CONGRESS

FIRST SESSION

PART 5—TV ADVERTISING OF FOOD TO CHILDREN

WASHINGTON, D.C., MARCH 12, 1973

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Television Advertising of Food to Children

MONDAY, MARCH 12, 1973

U.S. SENATE
SELECT COMMITTEE ON
NUTRITION AND HUMAN NEEDS
Washington, D.C.

The Select Committee met at 10:08 a.m., pursuant to call, in room 3302 of the Dirksen Building; the Honorable George McGovern, chairman of the committee, presiding.

Present: Senators McGovern, Hart, Humphrey, and Schweiker.

Staff members: Kenneth Schlossberg, staff director; Vernon M. Goetcheus, senior minority professional staff; and Elizabeth P. Hottell, minority professional staff.

Senator MCGOVERN. The hearing will come to order.

OPENING STATEMENT OF SENATOR McGOVERN, CHAIRMAN

Senator MCGOVERN. Before taking testimony from today's witnesses, I would like to make a brief opening statement.

I recently saw an editorial on the issue that this committee is now exploring—"Television Advertising to Children"—which said, just as well as possible, what we are trying to accomplish with these hearings. Let me quote for a moment from this editorial which appeared in Advertising Age:

> Television is a powerful communications tool. More importantly, perhaps: Television *is*. The challenge of TV is not found in seeking new ways to keep messages away from our children, but in striving to improve both programs and commercials. . . .
>
> There is a lot of room for improvement in kiddie show commercials. Hard sell spots aren't ameliorated by mod, stroboscopic techniques, or catchy jingles, or blatant puffery, or appeals to juvenile hedonism. Not to mention repetition.
>
> Too many commercials beamed at children still set up false hopes and, ultimately, undermine confidence in advertising. They feed those who consider advertising a bad word, a negative value, and kids are not exempt from this. If the toy or game doesn't live up to TV-inspired expectations, who is the loser? The youngster's loss is matched, perhaps, by what the advertising community loses. What other business can beat itself out of its future so quickly, so effectively, as advertising? Conversely, what other business has the opportunity to secure its future by making itself welcome on children's TV?
>
> We urge advertisers and agencies to learn from "Sesame Street" and "Electric Company." Try harder to produce informative and entertaining commercials, not just spots that sell. Inform the youngsters. Upgrade their lives; don't merely sell to them. Do this, and you will enable your young audience to grow into more productive, more effective persons. And as the children grow and enter the adult world, they become better citizens, better consumers.

I believe that all of us here today—representatives of the people and representatives of American food industry—do have the same basic goals in mind. All of us are interested, I hope, in making a contribution to the health and well-being of our Nation's children. I especially appreciate the decisions of the Kellogg Co. and General Mills to testify today. For years the names of these companies have stood for a genuine concern for improved nutrition in America. They are companies to whom we all look for constructive leadership in protecting and improving the diets of our children—indeed, for all of us. I know that their testimony will help the Congress in its effort to establish a sound national nutrition policy.

Nutrition Education Broad and Important

It is becoming increasingly clear to me, as the chairman of this committee, that the scope of this nutrition education issue—including the question of television advertising—is quite broad and as important as any health issue facing our people today. It is not an issue that this committee can investigate in these few days of hearings. Therefore, we are rescheduling our hearings to permit a fuller discussion.

In the weeks to come we hope to reinvite the companies and advertising agencies who have not yet had an opportunity to appear, as well as other members of the food industry—the sugar industry, confectionary industry, the soft drink industry. And, additionally, representatives of the producers of long-time traditional staple foods, such as vegetables, dairy products, and the like. Finally, we will reschedule the representatives of the broadcasting industry and the Government agencies involved in regulating nutrition advertising.

I expect by the end of this investigation we will have a complete and thorough view of the scope and quality of nutrition-advertising being directed at the American people, and the degree to which that advertising is helpful or harmful to their health.

Our leadoff witness today is the executive vice president of the Kellogg Co., Mr. William E. LaMothe. Mr. LaMothe, I understand you are accompanied by some of your associates. We will be glad to hear from you folks at this time. Howard List is the senior vice president of advertising; Dr. John Hopper, vice president and director of food research; Dr. Gary E. Costley, director of nutrition, all from the Kellogg Co.

We are pleased to have you gentlemen before the committee this morning.

STATEMENT OF SENATOR HART

Senator Hart. Mr. Chairman, may I join you in welcoming Mr. LaMothe and his associates at Kellogg. I did not come this morning just because Kellogg was going to be here, I intended to come anyway. However, I have a hunch I would have been required to change my plans when learning Kellogg would be here if I had not already intended to do so.

I am delighted that the Kellogg Co. has responded to your invitation. Michigan is thought of solely in terms of the automobile. Actually, the products that the Kellogg Co.—along with the Post Co.—may suggest that Michigan produces much more than heavy industry. I know that, as with the automobile, dry breakfast foods have had their critics. Many times, in both areas, the criticism has been valid.

But it is my impression—and I hope you will share it with me at the end of the hearing, Mr. Chairman—that the Kellogg Co. has been the first or if not the first, no one has taken a more positive position, nor made a more affirmative effort to respond to the problems that you have surfaced in these hearings.

Senator McGovern. I share your view, Senator.

STATEMENT OF WILLIAM E. LaMOTHE, EXECUTIVE VICE PRESIDENT, KELLOGG CO., BATTLE CREEK, MICH.

Mr. LaMothe. Thank you very much, Senator Hart, and thank you, Mr. Chairman. We are here today because we share your committee's goal to improve the state of nutrition in our country. More specifically, we are here to outline what we have done and what we are doing to contribute toward this goal.

To help me cover this ground I've asked Dr. Gary E. Costley, Kellogg's director of nutrition, on my right here, to provided you with nutritional information regarding our products.

Also with us is Howard M. List, senior vice president of advertising, on my left. Howard will cover specific advertising and corporate communication efforts. He will also report on our most recent effort referred to as our "Good Breakfast Program."

Now, before I call on these gentlemen I want to point out that the origin of both our company and industry sprang from the desire to develop more nutritious foods.

Dr. John Harvey Kellogg and his brother Will, the founders of Kellogg Co., developed ready-to-eat cereals as unique convenience foods in the late 1800's. The products from the very start were designed to be eaten with milk as substitutes for the heavy fat-ladened breakfasts of the late 19th and early 20th centuries. Today over 1.2 billion pounds of ready-to-eat cereals are consumed every year. Consumer acceptance of these economical new convenience products, that we introduced in 1908, was immediate and has continued unabated.

Nutrition has only recently become an acclaimed concern of Americans, but it has been the driving force behind our company since its founding. During the 1920's and 1930's the emphasis was on working with all types of grains—corn, rice, wheat, bran, and oats. In 1971, responding to a national dietary need, ready-to-eat cereals were restored to whole-grain levels of selected nutrients.

Mr. Kellogg had a keen interest in finding ways to improve the nutritional contribution of ready-to-eat cereals and became extremely interested in the soybean on his trips to China. This interest resulted in an entirely new approach to breakfast foods; the combining of ingredients rather than just flaking, puffing, or shredding a single grain food. In 1945, Corn Soya—a mixture of corn and soya—was introduced nationally. It had about twice the level of protein of most ready-to-eat cereals, plus significant vitamins and minerals.

I'd like to just pass this package up to the committee. It was printed in 1945 and even though it is almost 30 years ago, we have the back panel which says, "Always eat a good breakfast." So, we were promoting it quite a good time ago.

Corn Soya was marketed for about 15 years before declining sales forced its withdrawal from the market. However, the technological breakthrough that resulted in Corn Soya paved the way for the devel-

opment of Special K, a very palatable high protein cereal with a wide range of vitamin and mineral fortification. And in 1966, Product 19 was introduced, providing significantly increased levels of vitamin and mineral fortification.

Since then, the newer knowledge of nutritional needs and deficiencies in our country—as obtained from surveys and studies of recent years—have underlined the need for a good breakfast for people of all ages. In 1969, the White House Conference on Foods, Nutrition, and Health focused national attention on our country's changing nutrition problems. Kellogg recognized the need to continue, with a greater effort than ever, to increase the essential nutrient content of our cereals and to broaden further our nutrition education programs.

Today, continual advancements in the technology of vitamin and mineral application and long-term stability have permitted the fortification of all of our retail ready-to-eat cereals with eight essential vitamins at about one-third of the daily requirement, plus the addition of iron at significant levels.

Although our company's activities in improving the nutrition of our products and the public's understanding of the need for a good breakfast began years ago, we recognized the necessity for some significant new activities that might contribute to a better understanding of the need for good nutrition. We believe that good nutrition practices should start early in life and we have long placed emphasis on the importance of a nutritionally adequate breakfast for children, many of whom go without a good wake-up meal.

Breakfast is, in many respects, a unique meal that poses special nutritional problems involving the whole family, particularly children. Clearly, ready-to-eat cereals fill a need. Findings of a recent survey show that 47 million Americans sit down every day to a breakfast that includes a serving of ready-to-eat cereal and milk.

Breakfast is our business and we believe that this is the area in which we can do the most good in terms of nutrition education. Kellogg Co. believes it is important not only to provide a wide choice of cereals in tasty forms and flavors appealing to persons of all ages, but also to carry its product messages directly to all of the various age categories in the markets it serves. For years our company has placed great emphasis on creating honest and tasteful advertising with messages that convey the inherent food value of its products in a way that is informative and interesting.

Our company is very conscious of the fact that social responsibilities go hand-in-hand with business responsibilities. The steps that we are taking to contribute to the improvement of the understanding of the need for breakfast and a complete and adequate breakfast reflect this consciousness.

Communicating nutrition information is a complex problem. The informational needs of a homemaker are considerably different than those of a hospital dietitian. We provide specific information discussing nutrition needs of the family. Various foods and their contribution to the total diet are discussed in a manner mothers can easily understand. The importance of breakfast to good health and the contribution made by various foods at breakfast assist in understanding nutrition.

For 50 years, Kellogg's Department of Home Economics Services has developed and provided programs of informational and educa-

tional services. Breakfast teaching aids covering all foods ordinarily served at breakfast have been provided by Kellogg free of charge to elementary school teachers since 1949. Through participation in these breakfast games, more than 27 million children have learned about the importance of breakfast.

Over 6 million pieces of specially prepared material are distributed annually by the company to thousands of educators and other professionals. Nutrition and health education materials are provided in the form of charts, posters, booklets, games, and kits. And all are provided free of charge.

Kellogg's Nutritive Values Chart contains detailed information about our products. Much of this same information is printed on each cereal package, providing considerable information in an easy-to-understand form.

We distribute over 1 billion packages each year. And, what more perfect educational vehicle could there be than cereal boxes sitting on millions of breakfast tables? Recognizing this, for over 30 years we have included messages about good nutrition on our cereal packages. Our goal is to assist potential users of our products in choosing the correct foods essential to health and well-being.

We believe the advertising of food products and the potential educational impact of such advertising is directly related to the true nutritional values of the products being advertised. Because of this relationship, we believe it is crucial that accurate information regarding the nutritional aspects of Kellogg products be included in any discussion of our efforts in nutrition advertising or nutrition education.

Therefore, Dr. Gary Costley, director of nutrition of Kellogg Co., will provide testimony regarding nutrient utilization and the nutritional characteristics of Kellogg's breakfast cereals. Dr. Costley received his Ph. D. in nutrition from Oregon State University.

STATEMENT OF DR. GARY E. COSTLEY, DIRECTOR OF NUTRITION, KELLOGG CO.

Dr. COSTLEY. Thank you, Bill.

I look forward to presenting to this committee specific facts regarding the nutrient content and use of Kellogg's ready-to-eat cereals. I stress the word *facts* because numerous statements have been made in recent years concerning ready-to-eat cereals, many of which are untrue.

Before providing the nutrient content of our products, I will give specific data relative to general carbohydrate metabolism, breakfast-eating patterns in the United States, and how ready-to-eat cereals are utilized.

Carbohydrates are found in virtually all foods in the forms of sugar, starch, and cellulose. The sugars, often referred to as simple carbohydrates, include the monosaccharides and disaccharides and are present in such foods as jams, jellies, syrups, milk, fruits, and others. The starches, or complex carbohydrates, are traditionally found in such foods as cereals, potatoes, flour, and other vegetables.

As reported by the Food and Nutrition Board of the National Academy of Sciences, the body has a specific need for carbohydrates as a source of energy for the brain and for certain other specialized pur-

poses.[1] After these special requirements have been satisfied, carbohydrates and fat appear to be interchangeable as dietary energy sources, and in the diet they exhibit comparable protein-sparing effects. A precise minimal requirement for carbohydrate is difficult to assess, but in individuals accustomed to normal diets, at least 100 grams of carbohydrate per day appear to be needed to avoid ketosis, excessive protein breakdown and other undesirable metabolic responses.[2]

The blood sugar—glucose—level is maintained at a relatively constant rate but declines to a fasting level when no food is consumed for a period of from 10 to 12 hours.[3] Therefore, the metabolic need for carbohydrates is more pronounced in the early morning hours than other times during the day. Either simple or complex carbohydrates will satisfy this early morning need.

I have included this information because much that one reads suggests that carbohydrates, particularly simple sugars, do not contribute to good nutrition. Such unqualified statements are not consistent with the knowledge that carbohydrates supply the major portion of the daily energy requirement of the normal individual.[4]

In 1968, the Market Research Corp. of America [5] conducted a third household menu-census to study the eating habits in the United States. The breakfast patterns which emerged from this study are truly revealing. Approximately 10 percent of the American population does not eat breakfast and an additional 4 percent has only coffee. Thus, a total of 14 percent of our population consumes no nutrients at breakfast. Further, recent studies show that one in five children goes to school without a nutritionally adequate breakfast and fully 6 percent of all children go to school with no breakfast at all.[6] These facts are distressing since the physiological need for breakfast is acute.

Breakfast is the most important meal of the day, especially for young growing children. This fact was established more than 20 years ago by a series of controlled metabolic studies conducted at the University of Iowa and has been well documented in the scientific literature. In fact, the importance of breakfast to good nutrition has been so well established that it is unnecessary to dwell upon it further except to say that it continues to affect our efforts in highlighting the critical importance of a nutritionally sound breakfast.

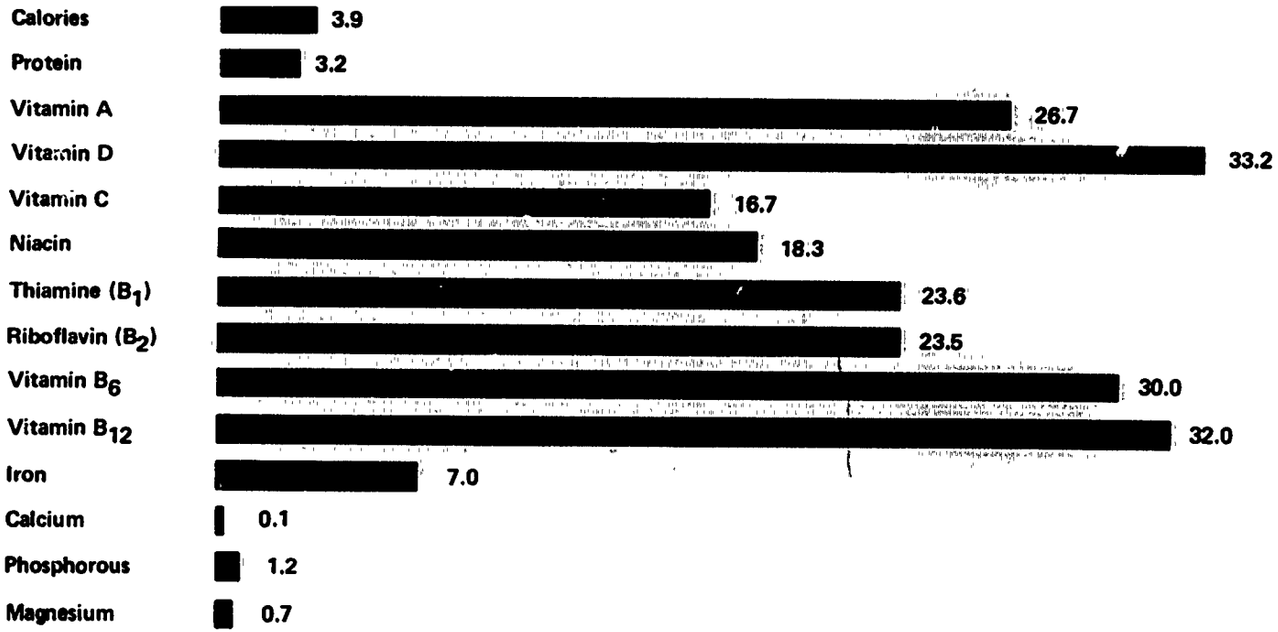
This point is emphasized because when one considers the specific nutritional aspects of a food, he must be cognizant of the role that food fulfills in the diet if his considerations are to be nutritionally valid.

The menu data reported earlier further show that ready-to-eat cereal and milk servings are a part of 25 percent of all breakfasts consumed in this country. Of even greater importance is the fact that more than 40 percent of the breakfasts consumed by children under 13 years of age contain ready-to-eat cereals as a component.[7] These data continue to impress upon us our tremendous responsibility to provide high quality, nutritionally sound products.

---

[1] National Academy of Sciences, National Research Council, 1968. Recommended Dietary Allowances. National Research Publication 1694.
[2] Gamble, J. L., 1951. Companionship of Water and Electrolytes in the Organization of Body Fluids. Lane Medical Lectures, vol. 5, No. 1, Stanford University Press, Stanford, Calif.
[3] K. Bryant, C. Martin, M. T. Schumacher, K. Daum, and W. W. Tuttle, 1952. Effect of Aging and Various Types of Breakfasts on the Blood Sugar Level. Journal of the American Dietetic Association, vol. 28.
[4] Oser, B. L., 1965. Fourteenth Edition, Hawk's Physiological Chemistry.
[5] National Household Menu Census, The Breakfast Study, July, 1967–June, 1968. Market Research Corporation of America, Chicago, Ill.
[6] Subcommittee Hearings on the Consumer Committee on Commerce, U.S. Senate, 1970.
[7] *Supra.*

Typical Nutrient Composition of Kellogg's Corn Flakes

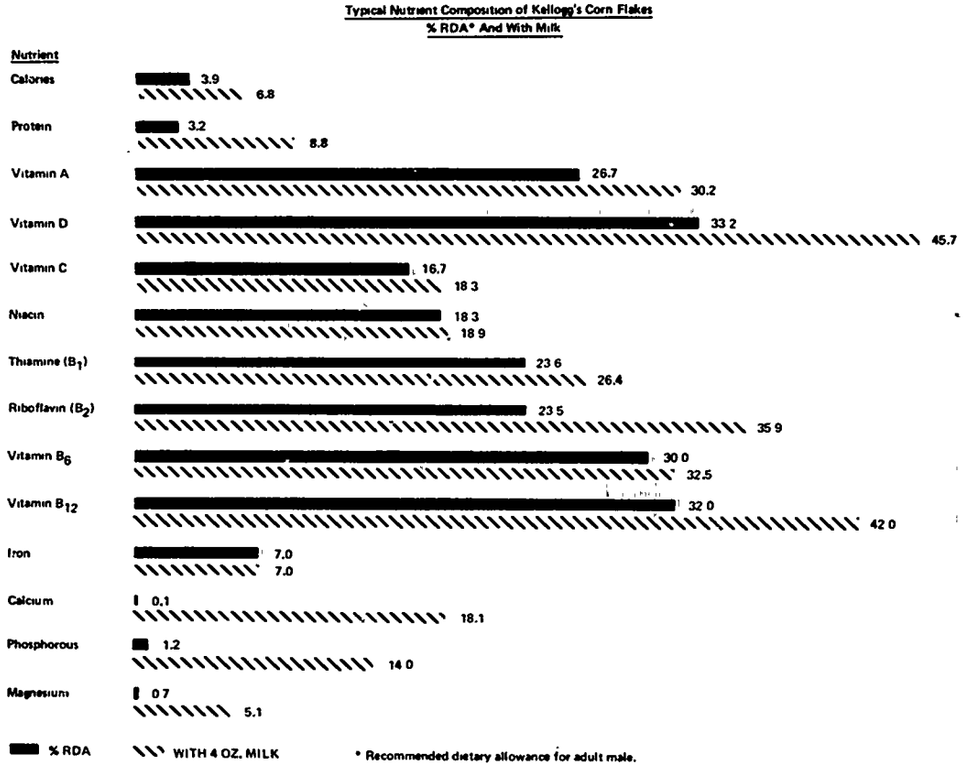


* Recommended dietary allowance for adult male.

If you will permit me, I am going to go to the chart and provi some specific data on ready-to-eat cereals. This chart gives the nutri..t content of Kellogg's leading product, Corn Flakes, expressed as a percentage of the recommended dietary allowances for the adult male and indicate that Corn Flakes are an excellent source of several essential nutrients: vitamin A, 26 percent; vitamin D, 33 percent; vitamin C, 16 percent; niacin, 18 percent, and so on, but are a relatively poor source of minerals, calcium, phosphorus, and magnesium.

Data collected by the National Family Opinion organization prove that 94 percent of all ready-to-eat cereals are consumed in combination with milk [1] and as a result of this let me show you the nutrient content of this same serving expressed with 4 ounces of milk.

[1] Cereal Consumption Study, 1972. Conducted for the Kellogg Co. by the National Family Opinion Inc., Toledo, Ohio


Typical Nutrient Composition of Kellogg's Corn Flakes
% RDA* And With Milk
Nutrient
Calories
3.9
6.8
Protein
3.2
8.8
Vitamin A
26.7
30.2
Vitamin D
33.2
45.7
Vitamin C
16.7
18.3
Niacin
18.3
18.9
Thiamine (B_1)
23.6
26.4
Riboflavin (B_2)
23.5
35.9
Vitamin B_6
30.0
32.5
Vitamin B_{12}
32.0
42.0
Iron
7.0
7.0
Calcium
0.1
18.1
Phosphorous
1.2
14.0
Magnesium
0.7
5.1
% RDA
WITH 4 OZ. MILK
* Recommended dietary allowance for adult male.

Now, this is a bowl of Corn Flakes with 4 ounces of whole, vitamin D-fortified milk. The combination has 8.8 percent of the protein requirement; 30 percent of the vitamin A; 45.7 percent of the vitamin D, and so on. It should be specifically noted the way in which cereal and milk compliment one another nutritionally because each supplies a good source of certain nutrients. Together they balance one another.

This can best be seen by looking at a specific example—vitamin C, for example. Cereal is a good source of vitamin C, whereas, milk is a very poor source. The same is true of niacin. Cereal products provide an excellent amount of niacin and milk very little. If you go down into calcium and phosphorus, there is very little calcium in cereal but the milk provides abundant amounts.

It is interesting, I think that the recently completed 10-State survey [1] pointed out specific deficiences in the American population of these cereal nutrients. For example, vitamin A was highlighted as being one of the most often deficient nutrients. Cereals are an excellent source of vitamin A. The same thing is true of vitamin C which is found to be deficient, and iron. Cereals are a good source of iron.

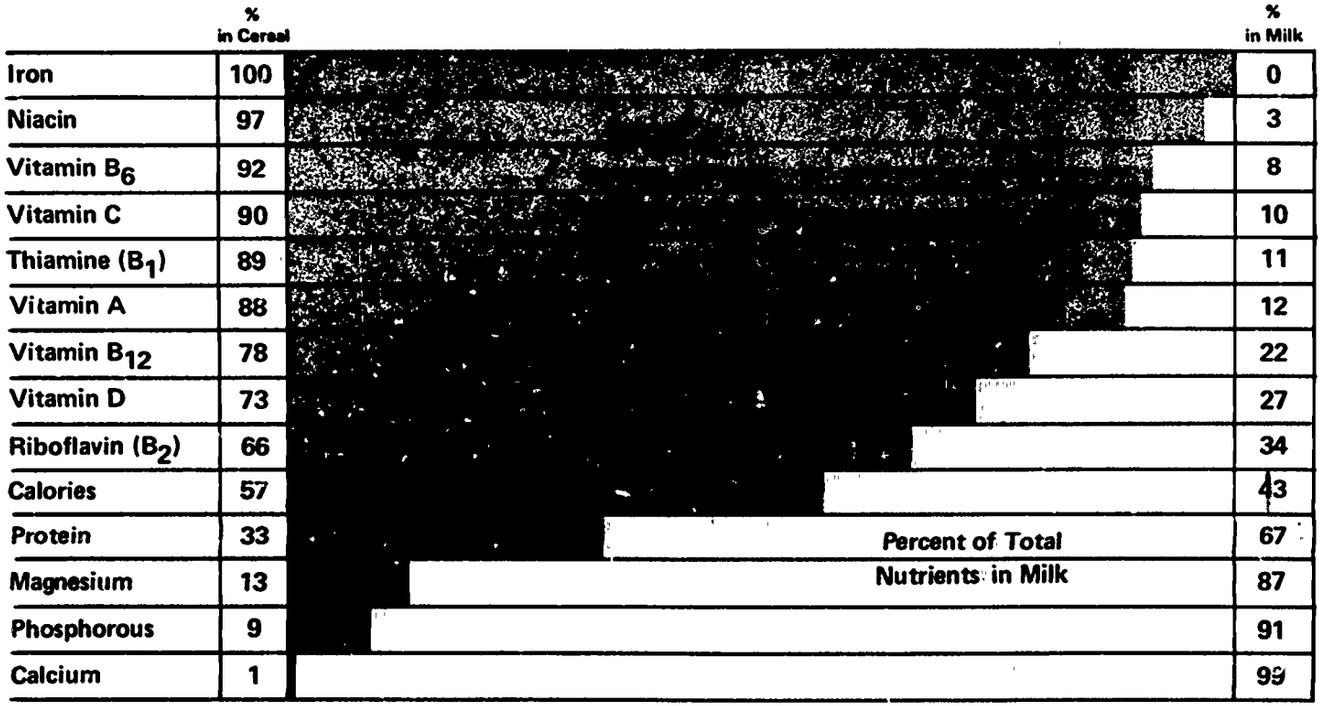
Another nutrient—which cereals are not a good source—the survey found to be deficient is calcium which the milk provides in abundant amount. So the point being the cereal and milk served the way it is actually consumed contributes very heavily to those nutrients that the 10-State survey showed to be deficient. To show this another way, let me show you a distribution of the milk serving and cereal. If you take the content that was on the previous chart and divide it into a 100-percent basis. In other words, 100 percent of all the iron in that serving is derived from the cereal, 90 percent of vitamin C derived from the cereal, the total of 99 percent of the calcium comes from the milk, 91 percent of the phosphorus comes from the milk and these data show or prove actually that ready-to-eat cereals and milk servings complement one another nutritionally and are an excellent combination together.

When discussing cereals, ready-to-eat cereals, the statement inevitably arises that cereals which are sweetened by the manufacturer are grossly inferior to cereals which are not. The fact is that is not true. Let me show you a chart that makes a direct comparison between two products, corn flakes and sugar frosted flakes.

The gray lines represent the nutrient content, again expressed as a percent of a daily requirement for an adult male, and the black lines are for sugar frosted flakes, a comparable product with the exception one is presweetened while the other is not. I think it should be specifically noted the vitamin A content is identical; vitamin D content is the same, C, niacin, B_1, B_2, B_6, B_{12}, and iron. There is a slightly lower level of protein in the sugar frosted flakes compared to the corn flakes. Same is true for phosphorus and magnesium but even casual inspection of these data suggests that these difference are totally insignificant.

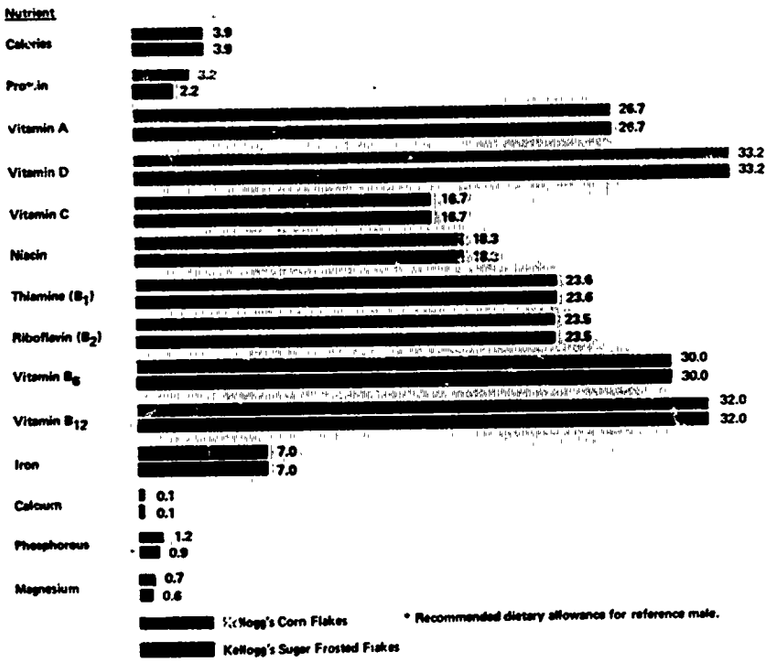
[1] Ten-State Nutrition Survey, 1968–70. U.S. Department of Health, Education, and Welfare. DHEW Publication No. (HSM) 72–8134.

Relative Contribution of the Nutrients in a Corn Flake and Milk Serving



Typical Nutrient Percentages of Recommended Daily Allowance*

For Kellogg's Corn Flakes and Kellogg's Sugar Frosted Flakes



The criticism of presweetened cereals generally comes from people who either have not seen these data or don't understand their significance. This basic information is printed on the side panel of every Kellogg cereal package. As a result, I am continually puzzled at statements in the popular press and elsewhere which are totally inconsistent with the nutritional facts of these presweetened products.

Let me turn from the protein, vitamin, and mineral content of presweetened cereals to dental caries, a subject which received considerable discussion last week before this committee.[1] You were told that Kellogg Co. has supported extensive studies on dental health, and indeed we have. We have allocated many hundreds of thousands of dollars for dental health research during the past decade.

Earlier testimony before this committee suggested that the addition of phosphates to the diets of rats was effective in preventing dental caries. We conducted similar experiments several years ago in cooperation with the National Institutes of Health. Our studies, like those reported to you earlier, indicated that phosphates were effective in preventing dental caries in laboratory animals fed breakfast cereals. As a result of this, we supported a 3-year clinical study which was conducted by Dr. Robert L. Glass, Forsyth Dental Center in Boston.[2] This study involved approximately 1,000 children. The results of this research clearly demonstrated that the addition of phosphates to cereal, which may be effective in laboratory animals, had no effect on the development of dental caries in children.

During this study, these 7- to 11-year-old children received 14 different Kellogg's breakfast cereals, 4 of which were presweetened, free and upon request during a 2-year period, and thus their consumption was much higher than the national average. Complete dental examinations were made upon initiation of the program and annually thereafter. The results show no correlation between the new dental caries observed and the total amount of cereal consumed or the amount of presweetened cereal consumed. This study is now in preparation for publication.

Now, I'd like to deviate from my text and go over the facts of that study again because I believe them to be critical based on some of the testimony that was given last week. This study was conducted by an exceptionally fine scientist at the Forsyth Dental Center in Boston. And it involved 1,000 children. They received ready-to-eat cereals at random as much as they wanted over a 2-year period. Their consumption was considerably higher than average, and there was no correlation between the total amount of cereal consumed or the amount of presweetened cereal consumed, and dental caries.

In another clinical study conducted under the direction of Dr. Sidney B. Finn, of the Institute of Dental Research at the University of Alabama,[3] dental caries incidence was compared in children consuming presweetened cereals versus those consuming regular cereals with added phosphates; no differences were found between children consuming the regular cereal with added phosphates and those consuming presweetened cereals.

[1] See NE 3, hearing of Mar. 5, 1973, pp. 275–305.
[2] Glass, R. L., Forsyth Dental Center, Boston, Mass., personal communication.
[3] Finn, S. B., and H. Jamison, 1969. "The Relative Effect on Dental Caries of Three Food Supplements to the Diet." Institute of Dental Research, University of Alabama, paper presented: International Association for Dental Research, 47th general meeting.

Let me now turn to the subject of sugar itself. First, there has not, I repeat not, been an increase in per capita sugar consumption in the United States over the past 40 years.[1] This fact is often blurred because people report large increases in industrial use of sugar. What is not reported is the fact that in-the-home use of sugar has declined at the same rate that industrial use has increased. This is not unexpected when one looks at the shift in eating patterns from home-prepared to preprocessed foods that has occurred during this time period

Sucrose, or common table sugar, is synthesized by nature, man simply extracts the substance from plants. Many natural foods contain sugar as a component. An interesting fact is that fresh citrus fruits, no doubt one of nature's most popular and nourishing foods, contain high levels of sugar. Fresh orange juice contains approximately 10 percent simple sugar of which half is sucrose, the same compound so often maligned when added to processed foods.

I am not saying citrus fruits are bad because they contain sugar—to the contrary they are exceptionally nutritious foods. Further, I am not conveying the idea that sugar itself is an excellent food, because it is not. It contains calories but no vitamins, minerals, or protein.

However, it is nutritional nonsense to evaluate a food on the basis of its sugar content alone. One must look at a food in its entirety, not at its isolated segments.

If one were to take literally the charge that TV advertising is preconditioning children to consume larger quantities of sugar, it is reasonable to expect that as TV advertising of foods has increased, a corresponding increase in per capita sugar consumption would be noted. This has not occurred. Food advertisements have been on TV for a period of about 20 years, yet during this time period, sugar consumption has been static as reported by the U.S. Department of Agriculture. These facts are in direct disagreement with the allegations made recently before this committee.

Let us now move to the subject of nutrition education. As a professional nutritionist, I am very concerned about the poor eating habits and the extremely meager understanding of nutrition within the American population.

The food industry can provide nutrition information not only about its products, but a balanced diet as well. Various means of communication can be utilized to disseminate this information.

Mr. Howard List, senior vice president, advertising, will now provide some specific examples of what we are doing in the area of nutrition education utilizing various means of communication.

Thank you.

STATEMENT OF HOWARD M. LIST, SENIOR VICE PRESIDENT—ADVERTISING, KELLOGG CO.

Mr. LIST. Thank you, Gary. Before starting my testimony, I would like to make a comment on Senator McGovern's opening remarks. At the risk of seeming a bit patronizing, which is not my intent—but people in my profession these days have a little trouble in making statements without seeming to have ulterior motives—I wanted to explain

[1] Page, L., and B. Friend, 1972. "Level of Use of Sugars in the United States." Consumer and Food Economics Institute Agricultural Research Service, U.S. Department of Agriculture. Presented at the International Conference on Sugars in Nutrition, Vanderbilt University, Tennessee.

that I was struck by the wisdom in the editorial, sir, that you read this morning. I was handed a copy of your opening remarks just before I arrived and refer to the comment you made:

> What other business can beat itself out of its future so quickly, so effectively, as advertising? Conversely, what other business has the opportunity to secure its future by making itself welcome on children's TV?

That certainly is the challenge and responsibility and that is the spirit in which we approach our testimony.

Based on our experience through the years, we hold the view that to be truly resultful, consumer communications on better nutrition must be approached in both a total and completely coordinated manner, to all age groups. We believe this can best be accomplished primarily through a better utilization of all channels of communication. Nutrition education is both a vital and a never-ending job where media advertising has an important role, but of which it is only a part. Advertising can be a very effective vehicle for creating an interest in nutrition, because it reaches large numbers of people of all age groups and can present nutritional information in an interesting manner.

The task of total communication involves three principal categories: (1) Nutritional Information; (2) Nutritional Education; and (3) Nutritional Motivation. Kellogg Co. has been active in all of these areas for many years, and in view of obvious needs we have increased our efforts in all three categories.

Better nutrition must be approached in terms of the total diet, not just a food group or a single kind of food. It must be developed in a manner that is meaningful to changing life-styles and the individual . . . to individuals of all ages, including children. These considerations are especially relevant to breakfast . . . which has become most individual meal of the day.

As Dr. Costley mentioned earlier, the breakfast skipping habits of children are a serious concern. Many of them go without a good wake-up meal. Therefore, we are placing more emphasis in our advertising to children on the importance of a nutritionally adequate breakfast. Research done at a leading university provides scientific evidence that those who eat a good breakfast are more alert, exhibit faster reactions and less fatigue, and thus better capacity for learning than breakfast skippers.

The faster pace of modern living . . . more mothers working outside the home . . . many things to do in the morning with little time to do them . . . family members arising and leaving at different times . . . finicky morning appetites, and other demands have made breakfast in most homes a very individual affair. Further, there is a need for nutritious, easy-to-prepare foods, and these facts help to explain the widespread acceptance and use of ready-to-eat cereals by persons of all ages.

Kellogg Co. recognizes that advertisers to children have a responsibility to present their products in a very realistic and forthright way. For this reason, we take special precautions in preparing such advertising.

All of our commercials to children are in strict compliance with the Provisions for Children Code of the National Association of Broadcasters, the code boards of all of the networks, the newly developed codes of Advertising to Children by the Association of National Advertisers, in which we were a participant, and the voluntary self-

regulation of advertising via the National Advertising Review Board and the Council of Better Business Bureaus. In addition, our own corporate procedure on approvals requires that all advertising and promotion of any kind be submitted to our nutrition scientists and our legal authorities for a thorough examination and approval before it is released for airing or publication.

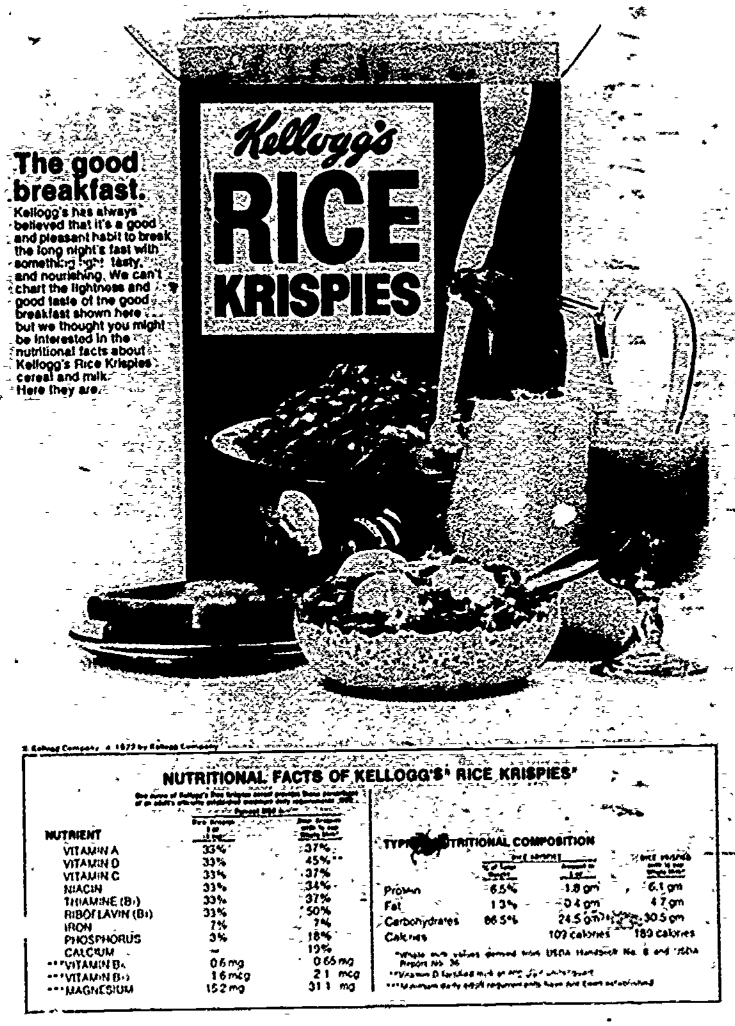
Kellogg Co. has demonstrated social responsiveness through its advertising to all groups. Nutrition surveys, scientists, and dietitians affirm that breakfast is a most important but frequently neglected meal. Through the years, by providing more information on products and usage, and in describing the benefits of our products in terms of convenience, taste, and nutrition, we are encouraging Americans to eat a good breakfast. When improvement of breakfast eating habits results from advertising, it can only be considered a benefit.

We consistently try to get our product nutritional messages and the better breakfast story told as a part of a coordinated nutrition information effort. First, on all of our packages, as you saw earlier. Then, with the consumer services and nutrition materials of our Department of Home Economics. And, of course, in our media advertising—print, television, radio, et cetera.

I believe this latter effort in nutrition education can best be demonstrated by showing the committee some of our print advertisements and television commercials. Here are some examples of advertisements from our Nutrition Information Print Campaign. This is an important part of the continuing consumer effort that we schedule annually, encouraging complete breakfasts and better nutrition.

And now, if we may have the lights, I would like to show you some of these advertisements.

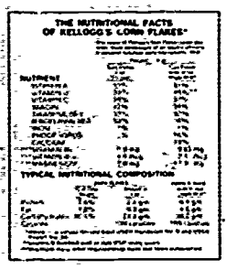
This one featuring Rice Krispies, shows the importance of breaking the fast with a good morning meal and shows the nutritional values of the cereal and the cereal with the 4-ounce serving of milk, which are contained in the nutrient facts box at the bottom of the advertisement.



Here is an advertisement typical of a series which shows nutritional facts about Kellogg's Corn Flakes. To the right there is a blow up of that portion of the ad illustrating a basic breakfast and giving the nutritional contribution of Corn Flakes in the one column to the left and values for Corn Flakes and ½ ounces of milk in the column to the right.

Fortified with 8 essential vitamins!

Have a good breakfast tomorrow. Build it around Kellogg's Corn Flakes. Nutritious, sure . . . plus the good corn flavor and famous freshness that make them the best liked, most eaten ready-to-eat cereal in the world. Vitamins may never be the reason you love 'em, but they make it a good thing you do. Eat 'em all up!



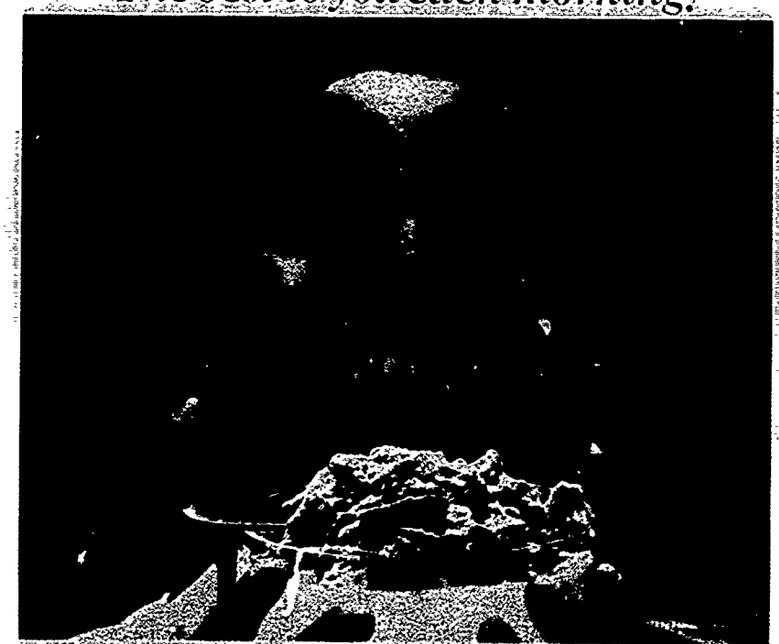
Kellogg's.

"The best to you each morning"

Here is an advertisement for Special K, and the type of vitamin fortification of this product is here presented in terms that are meaningful to the whole family.

"Great Tasting Nutrition" is the caption of our advertisement for Product 19, along with a chart presenting the product's nutritional values and a complete breakfast.

"The best to you each morning."



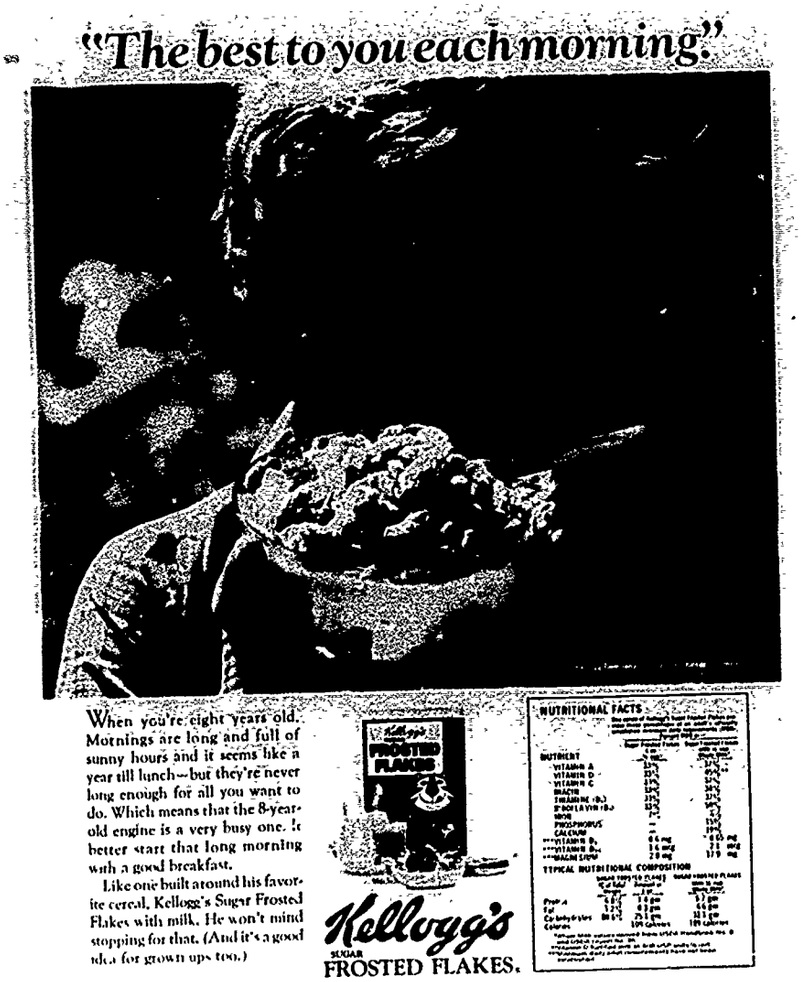
Would you believe there's somebody who gets a bigger kick out of Freddy's breakfast than Freddy.

Sure, he gets the good nutrition of a breakfast built around Kellogg's Sugar Frosted Flakes and milk. And he gets it as he likes it . . . in a hurry, and delicious.

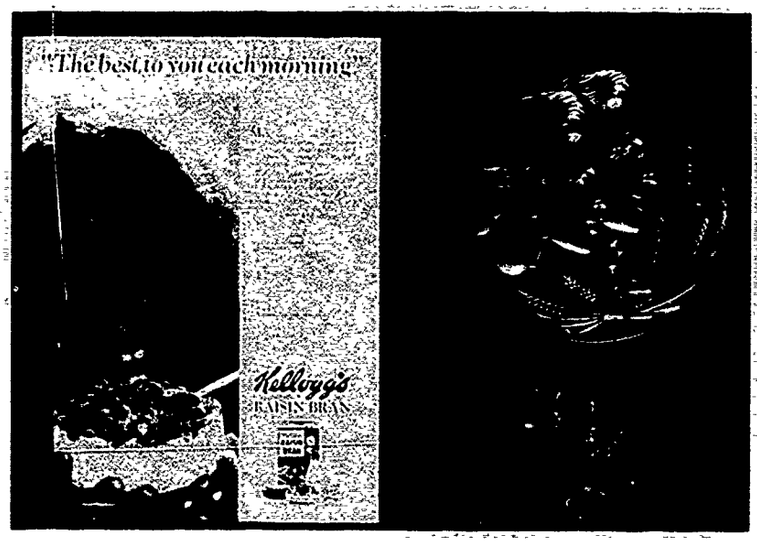
But while Freddy gets the nourishment, Mother gets his million-dollar smile. That alone makes mother's morning a success. Besides, she'll probably sit down late to the same good breakfast herself.

Kellogg's SUGAR FROSTED FLAKES.

All of Kellogg's presweetened cereals are fortified with eight essential vitamins and iron, so, appropriately, we ran several ads built around a Sugar Frosted Flakes breakfast.



And this print ad for Kellogg's Raisin Bran, one of a series, was given an award by the Family Health magazine for promoting greater public understanding of nutrition.



Now, we also feel it is important to present nutritionally complete breakfasts in our television advertising. Kellogg product commercials show the cereal and milk serving as a part of a nutritionally complete breakfast . . . juice or fruit, toast and spread, milk and cereal, and a glass of milk.

Now, we would like to present a few samples of commercials for various products directed to children. All of these have been broadcast in Saturday morning programs as well as on weekday programs for youngsters.

The first one up is an example of a typical commercial for Sugar Frosted Flakes that we ran last summer and fall during the campaign.

Next we want to show you a commercial that presents the nutritional values of Special K high-protein cereal, designed for use on all-family programs. We have also run this commercial many times on children's programs on Saturday mornings during the past 2 years.

Now, I want to tell you about a significant new development which is the latest extension of our continuing effort on nutrition education. It was first announced on January 29, by our president, Mr. Joseph Lonning at the American Advertising Federation Convention here in Washington and we understand it was discussed by some of the

committee members that same week. We call this new effort the "Good Breakfast Campaign." It will run on national television aimed primarily at children. This effort is a significant addition, we feel, to our nutritional education program. The goal of this campaign is to educate children to the need for breakfast, a complete breakfast.

In our two 60-second Good Breakfast messages, we present a variety of good tasting, appetizing breakfast foods. We've even put in a good word for the bacon and egg people, and other foods commonly served for breakfast.

As you will notice in these announcements, a cereal breakfast was not focused on, although it was included in the message because it belongs there. We will continue to promote the fruit, cereal and milk combination, because they were made to go together. Through the years we have featured this combination in both our print and broadcast advertising. We have had many joint promotions with the banana growers, the peach and blueberry growers, and have featured other fresh fruits such as raspberries, strawberries, et cetera, as a topping for the cereal and milk serving.

In our Good Breakfast Campaign messages, the only mention of Kellogg is the closing credit line which, as you may know, is the legal requirement for any television paid announcement. Kellogg's is buying television time to support these messages on national television. We want to make sure they get aired and are seen by children of all age groups.

Now, here is the broadcast plan:

These Good Breakfast messages will be scheduled on all three television networks, CBS, NBC, and ABC.

They will be scheduled every week for the balance of the year.

They will appear at least once on every Saturday morning network children's show during the year.

To reach preschool children during the week they will also be scheduled on such programs as "Captain Kangaroo."

And on daytime programs to reach parents . . . such as the "Today Show," because we want parents to know what we are saying to the youngsters.

These messages will reach virtually every child in this country at least once and most of the youngsters will see them several times.

Now, we'd like to show you those two announcements. The first one up has just been completed and is being shown here for the first time. It is age specific, and was developed to interest preschool and young children. Therefore, the message is very fundamental, simple, and direct . . . "Eat a good breakfast and a variety of foods."

The second announcement has been produced to reach older children and their parents. As mentioned, it will be broadcast not only on children's programs but also on some all-family and daytime programs as well.

May we now ask your indulgence to turn off the lights so we can see these messages? Please remember that the first announcement was developed to appeal to young children.

LEO BURNETT COMPANY, INC.

AS FILMED AND RECORDED (3/73) "Out of Gas" :60 KELLOGG KMA0330

Mr. LaMothe. Mr. Chairman, that concludes our testimony. We sincerely appreciate the opportunity that your Select Committee on Nutrition and Human Needs has made available to us to present some facts on our products and our continuing effort in nutrition education.

Senator McGovern. Well, thank you very much, Mr. LaMothe, Mr. List, and Dr. Costley. I want to, again, commend the Kellogg Co., on a very impressive effort in this nutritional educational field. There are some questions that I'd like to direct to you.

Last week the committee heard a number of witnesses, as you know, who expressed criticism of the kind of advertising being directed at

children today and especially what they described as the onslaught of heavily sugared foods. One of those witnesses was Dr. Jean Mayer, a renowned nutritionist, former White House adviser and incidentally, a member of the panel that last year awarded a prize to Kellogg for print advertising of nutrition. Dr. Mayer is no wildeyed reformer so I think what he has to say in these areas is all the more impressive.

I'd just like to read a couple of the statements he made and ask you to comment or any of you three gentlemen. He said first of all, and I'm quoting:

> I would like to make a very strong point in my belief that good breakfast cereals are an extremely useful food and at a time when cardiovascular disease is our number one health problem, the consumption of good breakfast cereal with a small amount of milk is an excellent way for people to get a good breakfast and reduce their intake of fat. Unfortunately, what is being propounded to children are extremely heavily-coated cereals with a great deal of sugar, many of which mothers assure me are consumed without milk and which cannot even if they are enriched with a few vitamins, be considered as good foods. In fact I have some very serious questions whether some products which have more than 50 percent sugar should be called cereals. I think they might more properly be called candy.[1]

I wonder if you gentlemen would comment on that. I don't know whether we have some of these samples here. There is one of your products that is called Fruit Loops, which does appear to look and taste like candy but in any event, I'd be interested in your comments on Dr. Mayer's conclusions.

RTE Cereals To Be Eaten With Milk

Mr. LaMothe. Well, Mr. Chairman, I guess I could make some comments. I'm just thinking perhaps Dr. Costley, too, would like to comment.

I think some important points that Dr. Costley made in his testimony this morning should be filtered through Dr. Mayer's comments and the most important point is that in this country cereal is consumed with milk; 94 percent of the cereal consumed in this country is taken with 4 ounces or about 4 ounces of milk, so we are talking about the serving of ready-to-eat cereal. If I could go back for a minute to the early days of cereal, I'm not sure how Mr. Kellogg or others thought it would be consumed, but it was traditionally consumed with milk and some sweetening. Most recent surveys taken in 1968, I think, by Roper, again confirmed that over 90 percent of the people add sweetening to nonpresweetened foods. The development of the presweetened segment of the industry seemed to be a very logical extension because people prefer their cereals sweetened.

The industry gradually found techniques to sweeten the products in the factory and the method of applying the sweetening gave a texture improvement, or at least a number of people felt that texture improvement was there, and the presweetened part of the industry grew.

Now, it is true that the presweetened cereals are sugar coated but we have also run tests with hundreds and hundreds of children because we wanted to know ourselves, do they add sugar on top of a presweetened cereal? We found they don't. We have run tests with children to see how much sugar they add to regular cereal and in the combination

[1] See NE 3, hearing of Mar. 5, 1973, pp. 259–261.

of presweetened cereals as consumed and regular cereals as consumed, the difference in sugar intake is virtually nil.

I really don't feel that it's fair to point out that a presweetened cereal, because it does have the sugar, could fall into a candy category because its end consumption is just like the other cereals; with milk, when consumed.

I'll ask Dr. Costley to comment further if I haven't fully answered that question.

Senator McGovern. In that connection, Dr. Costley, you showed us a breakdown on the charts of the nutrients in Corn Flakes and Special K and some of the others. Is it not a fact, though, that on these heavily sugared products like the Fruit Loop product, that you add a somewhat nutritional value or rather reduced value?

Dr. Costley. No, Senator, it's not. The data I showed you on Frosted Flakes, Sugar Frosted Flakes, and Corn Flakes is very typical of all of our presweetened cereals. As a matter of fact, Fruit Loops has a higher level of minerals than Sugar Frosted Flakes does. It has that because corn is not as good a source of minerals as oats and one of the base products of Fruit Loops is oats. These data that you see on that chart are very typical of all of our presweetened cereals.

Senator McGovern. Even these that appear to look and taste like candy have approximately the same nutritional value? Would that be true of the protein value, too?

DILUTES PROTEIN BY ADDING SUGAR

Dr. Costley. No, the protein is slightly lower, and the obvious reason for that is sugar doesn't have any protein so as you add sugar you dilute protein, but the point being that a traditional ready-to-eat cereal is not a good source of protein in the total diet unless it is consumed with milk.

The difference is that the protein content of Corn Flakes is 3.2 percent of the daily requirements; that's without milk. Sugar Frosted Flakes is 2.2. What you are talking about is a difference of 1 percent of the daily requirement and, again, there is the dilution of the minerals; calcium, phosphorus, and magnesium, but the calcium, phosphorus and magnesium, the non-presweetened cereals are not a significant source of those nutrients anyway.

Senator McGovern. As I recall Dr. Mayer's testimony,[1] one of the points he made—either in his prepared statement or in the question and answers—is that a lot of youngsters have the habit of grabbing a handful of these sweetened cereals like these Sugar Loops or the General Mills product here called "Grapefellow" and they eat them as snacks without milk.

While the overall figure that you get of the high percentage of cereals consumed, is true, I'm sure, isn't it fair to say that there is a practice among young children to use these highly sweetened cereals as a kind of snack, between meals, where they grab a handful and eat it as they would candy?

[1] See NE 3, hearing of Mar. 5, 1973, pp. 256–267.

"Fruit Loops Has Highest Nonmilk Usage"

Dr. Costley. Let me provide data on Fruit Loops. Actually, Fruit Loops has the highest nonmilk usage of any of our products and it is approximately 18 percent. One year it was 19 percent, but the point being that even Fruit Loops—80 percent are consumed with milk—I would point out, too, that our data shows that when they are consumed as snacks they are not consumed at breakfast. It's a snack, and I would suggest that Fruit Loops as a snack are much better than potato chips or a sweet roll. These products as a snack, when you want to utilize them that way, they are a very poor source of protein but an excellent source of vitamins, so that the snack value of Fruit Loops is not worthless. I would say, too, that I'm a little puzzled at Dr. Mayer's statement that presweetened cereals cannot be considered good food because if you say that Corn Flakes are good food and you look at the data on that chart on Corn Flakes and Sugar Frosted Flakes and they are virtually the same. I don't understand why the Sugar Frosted Flakes are not considered good food.

I think I take exception to that. They are good food.

Senator McGovern. Well, there does seem to be some conflict in the testimony, Dr. Costley, on this matter of sugar consumption in the United States. Dr. Nizel of Tufts University School of Dental Medicine told the committee, a few days ago, and I quote:

> As an indication of how rapidly sugar consumption is increasing in the United States, in 1963 industrial food processors used 5.8 million tons or 8 billion pounds of sugar, whereas, in 1967, 5.8 million tons or approximately 12 billion pounds were used, an increase of 33 percent in 4 years.[1]

Now, in your statement you make the assertion: "First, there has not, *I repeat not*, been an increase in s r consumption in the United States over the past 40 years." There seems to be——

Dr. Costley. Per capita.

Senator McGovern. Pardon?

Dr. Costley. The difference is that, when you report data the way Dr. Nizel is, he is reporting industrial use of sugar. OK. First of all, there is a big shift occurring in the United States on where people are getting their sugar. There is a large increase in industrial use because there is a large decrease in in-home use. People don't bake as much as they used to; they buy bread. People don't make their own ice cream; they buy ice cream. They don't make their own pies; they buy pies. That accounts for part of it.

The other difference is the per capita, because you notice that Dr. Nizel did not relate that data to per capita consumption.

Senator McGovern. No; he is talking about an overall increase of 33 percent in the industry.

Different Sources . . . Different Answers

Dr. Costley. Well, the data actually is footnoted there and in a publication by the Department of Agriculture. When you look at this data on sugar usage in the United States, you go to different sources; you get slightly different answers, but there has not been a per capita increase. In 1950—I believe this number comes right out of USDA reports in 1950—the per capita consumption of sugar in the United

[1] See NE 3, hearing of Mar. 5, 1973, p. 280.

States was nearly 100 pounds. 9[illegible]7. In 1973, it is 102. You know, these data come directly from Gove[illegible]ment figures on per capita consumption of sucrose.

I don't believe that Dr. Nizel's statement was on a per capita basis.

Senator McGovern. You are quite correct. He is talking about the overall increase.

I did want to direct a question at you, Mr. List. I'm sure that [illegible]erybody in this room and people all across the country applau[illegible] this "Good Breakfast Campaign" that Kellogg has undertaken recently. It seems to me it is an extremely commendable and public-spirited effort on the part of the company; but one of the things some of the health professionals told us is that there is so much counteradvertising of products that are damaging to the health of children, pushed so hard, that it is very difficult for constructive programs of this kind to get across. I think that if Dr. Mayer were here he would say the concentration on heavily sugared foods and snacks, and items of that sort, has the effect of almost canceling out the beneficial effects of a program such as yours.

Do you have any impression or comment on that problem?

Mr. List. Yes, sir. I would like to point out our good-breakfast program encompasses both regular and presweetened cereals. Maybe we didn't do a very good job here on the sample product commercials because we had a variety on principally presweetened cereals as we wanted you to see how we present these items.

However, we advertise Rice Krispies, Corn Flakes, and our other regular cereals as a part of breakfast just as we do with the presweetened cereals, so we do feel in responding to the needs of children as we define them—that is, the one out of five that go on to school without an adequate breakfast and the 6 percent that skip breakfast—and we do have an opportunity to make a positive contribution in our messages.

Senator McGovern. Did you say that on these products like Special K and Product 19, you also push those on the Saturday morning programs and children's shows?

Mr. List. We have run many times, sir, the commercial we showed you and the committee for Special K on Saturday morning. These products have an older age profile in terms of usage but we feel there are qualities here that are certainly fine for the whole family as you saw in our print advertising and our commercial, so we have run the Special K commercial you saw for almost 2 years now on Saturday mornings, not with great frequency but with enough frequency so as to present that product's values to youngsters directly, which is the goal, frankly, of our new approach.

We want to be specific to the age groups of youngsters because we know that is necessary, to be meaningful, to put into our messages something regarding the importance of breakfast and the role of milk and breakfast cereal as part of a complete breakfast. We try to show our products in context of a complete and good breakfast. So we hope we can communicate these values, sir, de[illegible]ite some of the things that have been said to the contrary.

Senator McGovern. Senator Schweiker:

Controversy—Excessive Sugar Destroys Nutrients

Senator Schweiker. One point on sugar is that some researchers show—again there is a lot of controversy, but we are beginning to learn a lot—that sugar in excess ultimately destroys some of your nutrients.

When you put up a chart on sugar-coated cereal—and this applies to any company, it is not strictly your company because w are having a dialog on some honest differences about nutrition—however, when you show that a sugar-coated cereal of any kind has the same relative nutrient going in, that may be well and good. But high concentrations of sugar destroy the vitamins and some of the essential nutrients and minerals. So, in essence, you are also putting in the ingredient which destroys the very nutrient you are adding.

I am sure you won't agree with that, but there are some scientific studies which indicate that, and this is one of our concerns about sugar.

Dr. Costley. The data there is for the finished foods, and those are analyzed amounts. Those are not the amounts that we put in. It is the amounts that we find—actually after on-the-shelf stability. They are put on the shelf and tested to see they meet our nutritional requirements.

You are right. There is some information that sugar may relate to the biological availability of nutrients, but that data are very sketchy at this point. It has certainly not been confirmed, and these data report what is in the food, not what we put in the food. The best procedures that are available today are utilized to analyze for nutrients in these products.

Senator Schweiker. The third point I want to make, I am making in terms of the industry. I am not making it in terms of your company because we are glad to have you here to talk about it.

I just recently chaired a hearing on diabetes[1] and rather shocking facts came out of the testimony. By 1980, one out of every five Americans will either have diabetes or inherit the characteristic of diabetes which, perhaps, they can pass on to their children or grandchildren. Furthermore, diabetes is the second leading cause of blindness in the United States. In 10 years it will be the first.

Dr. Mayer pointed out in his testimony that there are some studies being shown that there is a direct link between the amount of sugar we consume and the body's ability to combat diabetes. Of course, this is new research, but with the number of Americans who are, and will be, effected by diabetes—one out of every five—and with sugar being related, in terms of volume consumed, to diabetes, I think it raises some very serious questions about how much sugar we, as a country, should be promoting, and whether we shouldn't have labels on food commodities stating the sugar content.

Again, you might like to comment. You may not agree, but these are questions we have to raise.

Dr. Costley. One of the things is our difference on whether or not sugar consumption per capita is actually increasing. I would be happy—and I do not have that report from the Department of Agriculture with me—to submit to you the per capita sucrose intake in the United States. I believe it started in 1950. It reports from 1950 through 1973. If you like, we would be happy to submit that. I think what is

[1] Committee on Labor and Public Welfare, Subcommittee on Health, hearing of Feb. 26, 1973

really germane is whether or not sugar consumption or sucrose consumption is really increasing.

I would say there has been a decrease in calorie consumption in the last 10 years in the United States, and as a result of that there is a higher percentage of the total American diet derived from sugar. This decrease in calories has not been very dramatic and does not account for the large increases of sugar that people are reporting. I do not think the data on sugar consumption substantiates some of the statements.

Senator SCHWEIKER. Are you talking about recent sugar consumption? I realize there is a difference of facts. Are you talking about recent sugar consumption not increasing? You are not arguing that we have not increased the sugar intake tremendously since 1900, are you?

MARKED INCREASE IN SUGAR CONSUMPTION SINCE 1870

Dr. COSTLEY. There has been a marked increase in the sugar consumption from 1860 or 1870. The sugar consumption has increased.

Senator SCHWEIKER. We are together on that.

Dr. COSTLEY. Part of my testimony was related to television advertising because of the idea that television advertising is preconditioning people to consume more sugar. I have some serious reservations that the sugar consumption data support that allegation.

Senator SCHWEIKER. The point I am making—and it is not too relevant to the TV advertising—is that there does not seem to be much disagreement that the sugar consumption has gone up 40 percent since 1949.

A disease like diabetes has gone up tremendously since 1949. It is now a fact of American life, and again I do not know what these research studies are going to finally conclude, but it can only point to suspicion. However I think there is some concern about the per capita sugar consumption over a long period of time. I wouldn't really differ with what you are saying over a relatively short period of time except that consumption of flour and starches is definitely going down. Furthermore, it is not only in relation to the percentages, but also a relationship in terms of the composite picture.

I think Dr. Mayer pointed out that for the first time we are consuming more sugar than bread and other starches. This statistic may well be significant too, but again it is a debatable question.

That is all I have, Mr. Chairman. Thank you.

Senator MCGOVERN. Thank you very much, gentlemen.

We would like to call Miss Mercedes Bates, vice president and director of the Betty Crocker Kitchens of General Mills.

Senator HUMPHREY. I am very happy to see you here today.

STATEMENT OF MERCEDES BATES, VICE PRESIDENT, DIRECTOR OF BETTY CROCKER KITCHENS, GENERAL MILLS, MINNEAPOLIS, MINN.

Miss BATES. Mr. Chairman, members of the committee, I am delighted to have an opportunity to be here today in answer to the invitation of your chairman to testify about our nutritional education policy.

First, I want to stress to you that I am a home economist, not a nutritionist. As an employee of a big company with many specialists, I consider myself to be a generalist—a generalist because the Betty Crocker Department has as its charge the assistance of consumers in the homemaking area, and nutrition education has been one of our responsibilities for many years.

My own interest in nutrition education goes back to the days of World War II when I taught Red Cross nutrition classes in all kinds of unlikely locations. I think my most exotic spot was an Abbey Rents ambulance station.

Nutrition has changed greatly in the years since I was in school. It is a relatively new science and each year brings new discoveries of great and far-reaching importance. Our nutrition services department is composed of professionals in this area who interpret this research to us. But for general education purposes, we believe that nutrition education should stress the need for balanced meals. Knowledge of vitamins and minerals and trace elements is of little use unless this information can be translated into actual food intake. So, in general, our nutrition education efforts have concentrated on assisting the homemaker to plan daily menus which will nurture her family adequately because the selection of foods is broad and made according to the basic four food groups.

I've read with great interest the stories in the press about this distinguished committee's interest in sugar consumption. Sugar, a carbohydrate, represents just one category of food, and sweetened foods must be viewed in light of their relationships to other foods eaten. We know, for example, that less than 3 percent of a child's daily sugar intake comes from presweetened cereals. Many other products are also sweet and therefore appealing. Desserts such as cakes, frostings, ice cream, and cookies are looked upon as reward foods, or fun foods, if you will. Too much of a good thing may be bad. For instance, excessive intakes of protein, fat, cholesterol, salt and a number of other nutrients can be detrimental to the health of some.

According to the then executive director of the nutrition foundation, it was established over 10 years ago "how urgent the need is for the public as well as scientists to understand the concept that all nutrients are only safe or useful to the body within a limited quantitative range . . . they are all harmful if consumed in excessive quantities, and harmless—just as salt or pepper would be—when consumed in sufficiently small quantities.

It is important to remember that sugar makes things taste good and therefore makes sources of nutrition palatable. In a statewide nutrition survey conducted in 1969 among 80,000 Massachusetts public school children, 13 percent came to school on survey day having had nothing to eat and only 5 percent ate a good breakfast that morning. Sixty percent of all breakfasts are nutritionally inadequate, so we believe that fortified, presweetened cereals do have a role in providing nutrition.

To keep this subject in perspective, I hope you will remember that less than 2 percent of all supermarket sales are represented by General Mills products.

It is the story of balanced nutrition which we think is most important and this is the area in which we have concentrated. I want to

stress to you that we are not newcomers to the field of nutrition education. Our interest has been keen for many years.

General Mills was in the forefront of the movement to enrich flour, one of the first basic moves to improve general nutrition. This booklet produced in the early 1940's by the Wheat Flour Institute, of which we are a founding member, was distributed to schools along with a nutrition study kit. General Mills' leadership in the development of flour enrichment is universally recognized. Flour enrichment became national policy during World War II. Some experts have termed the development of the enrichment program the outstanding nutritional contribution of the century.

In 1942, at the request of the War Food Administration, Betty Crocker, then an 18-year veteran of her "Cooking School of the Air," broadcast a special program called, "Your Nation's Rations." It helped homemakers make the most of rationed foods. The radio time was donated by the National Broadcasting Co. and Government officials appeared with Betty Crocker. Almost 7 million copies of a Betty Crocker wartime booklet, "Your Share," were distributed at this time.

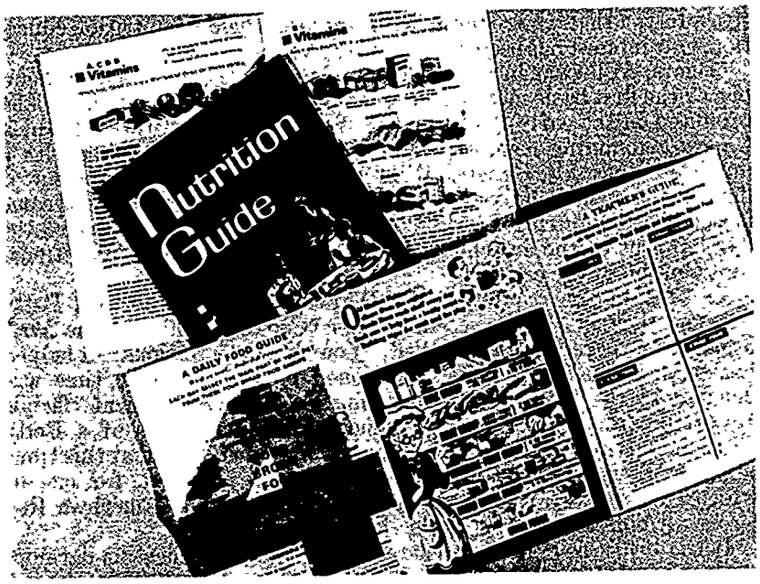
Other Betty Crocker wartime publications followed, for one of which General Mills won national recognition by the American Red Cross for outstanding service in the national interest.

In the 1940's, as part of a General Mills nutrition education development program, General Mills produced this film "And So They Learn." It recorded teacher workshop techniques for teaching food values to elementary school children.

This was followed in 1948 by "The School That Learned To Eat," a documentary film showing how one school mobilized community resources to improve health and nutrition. This was chosen for the 1948 International Film Festival held at Edinburgh, Scotland, and was seen in schools and on television by an estimated 2 million people.

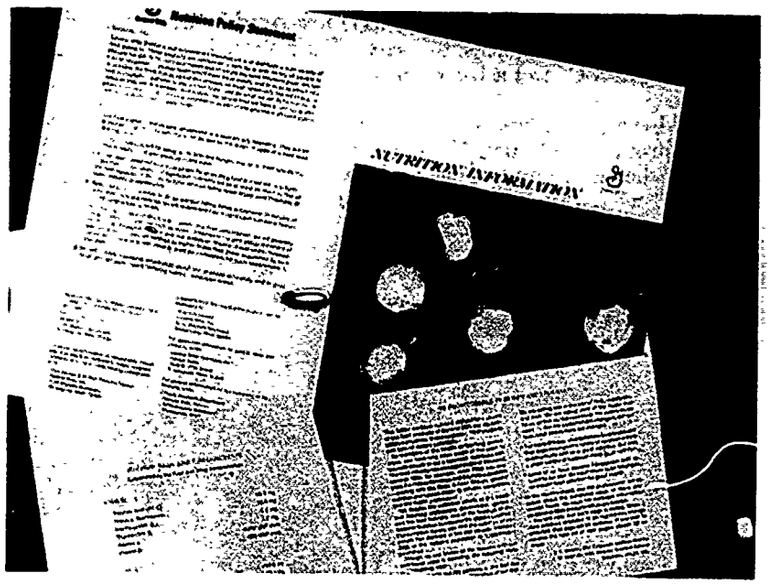
In 1952, a third motion picture was produced by General Mills entitled "Food as Children See It." In all, this was seen by almost a million through private showings and over 4.5 million on television. It told the basic story of nutrition for children and the introduction of good food habits to young children. It was also used widely in medical and nursing schools where such teaching aids were in great demand.

Altogether, this nutrition program of teacher workshops, publications, and films reached a conservatively estimated 25 million students.



Following this program, nutrition guides and charts like these have been distributed through our public relations department to schools and to individuals.

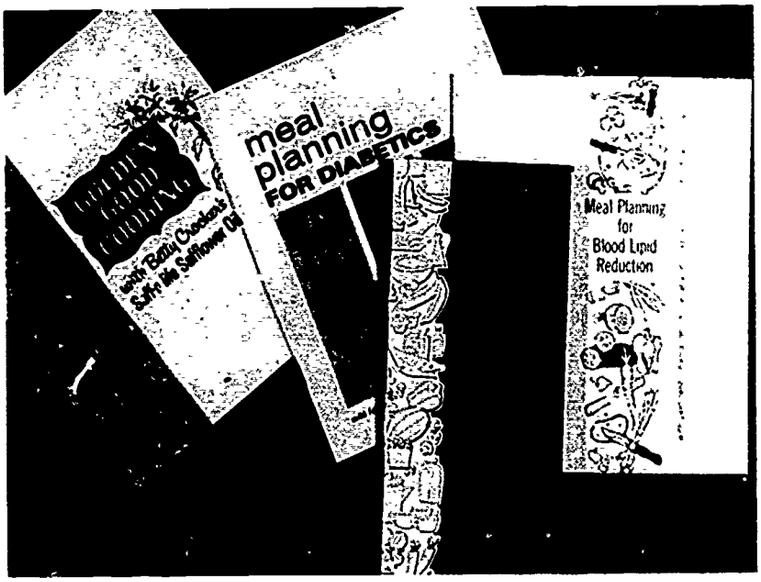
In 1963, our nutrition services department, headed by Dr. Ivy Celender, was established at General Mills. Her primary responsibility at first was the distribution of nutrition information to other professionals, dietitians, doctors, and nurses. Over the years, her department has grown to a staff of eight. Staff members have attended 37 medical and dietetic conventions and prepared and distributed a total of 1.5 million messages to the health professions and consumers. This is General Mills policy statement on nutrition and point No. 6 reads, "We will convey nutritional information about our products accurately and in good taste, and will work toward bettering nutrition education over all."



This represents an assortment of booklets prepared by nutrition services and the Betty Crocker Department for general distribution on such subjects as meal planning for the golden years . . . for young children . . . for the pregnant woman. They have been widely distributed. "Pickles and Strawberry Ice Cream" was an advertised booklet in the Betty Crocker Spokesman column.

These are general information sheets prepared by nutrition services to answer special requests by mail. They include sources of iron, vitamins A and C, and a listing of the basic four in both English and Spanish.

In addition, booklets have been prepared for those with special dietary problems. Golden Good Cooking is low cholesterol cooking, and the other three are on meal planning for diabetics, planning fat-controlled meals, and meal planning for blood lipid reduction.



The products and the nutrition education represented by these booklets may never be found on a supermarket shelf. They are products developed for those with dietary problems who cannot eat regular foods. Paygel-P is a high purity wheat starch for those with renal disease, who cannot tolerate protein, Chono is an imitation whole egg powder. Multipurpose food is a soybean-based extender which has been shipped around the world. All of these we call "Foods For The Few." They do not represent large sales, but they are very important products to those who must depend upon them.

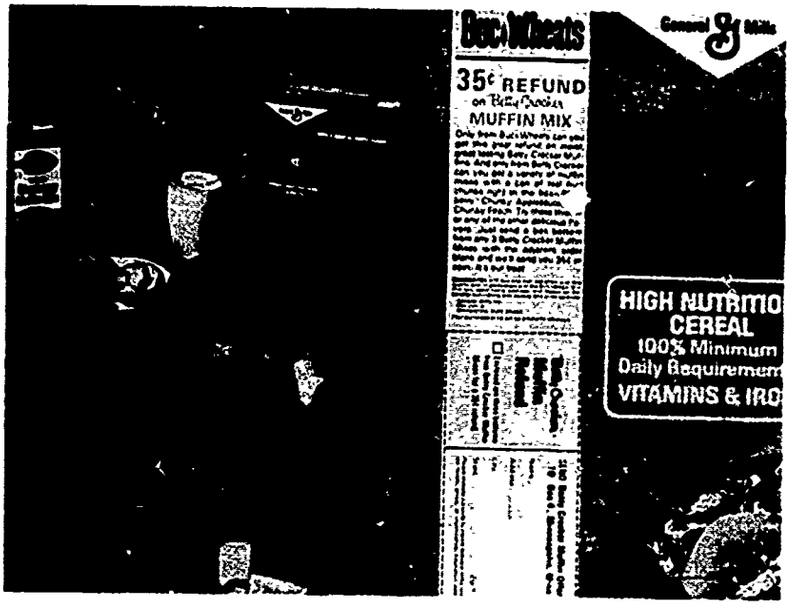
Away-from-home eating has become increasingly important. And this nutritional information chart covers those products in our food service division which are distributed through institutional channels.

In 1961, General Mills was the first to introduce a cereal fortified with eight essential vitamins. During the past 10 years, more than 100 million Total packages have devoted the back and the side panels to the subject of health or nutrition.

This is a current Total package. It shows graphically the ingredients of a nutritionally sound breakfast. There is also an offer for six newly produced nutrition booklets available through the mail. We believe in educating the consumer who can best use that education—the parent. After all, few young children have control over menu planning in their homes. It is the mother who performs this function, and so it is most often to the mother that we direct our nutrition message. To make a meaningful statement on a subject like nutrition requires more words than a 30-second television commercial permits. That is why at General Mills, we believe strongly in the cereal package—America's second newspaper—as the carrier of our messages. At the breakfast table and on the cupboard shelf, the package gets repeated exposure. And so, we address our nutrition message primarily to parents, and we tell it primarily in print.

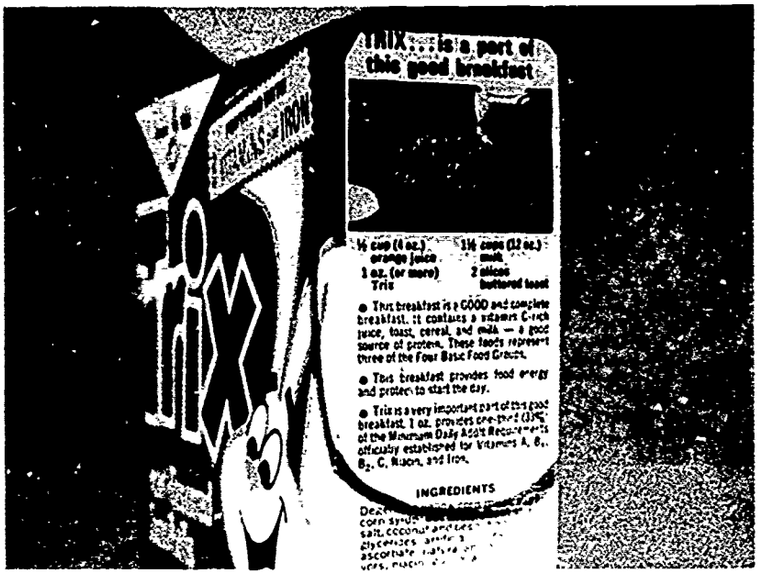
During the past 10 years, 133 million Wheaties packages have also carried the story of health or nutrition. This is a current package with the description and picture of a nutritionally adequate breakfast.

This is a Buc*Wheats package. Buc*Wheats is a high nutrition cereal, and again the package back carries the nutrition message.

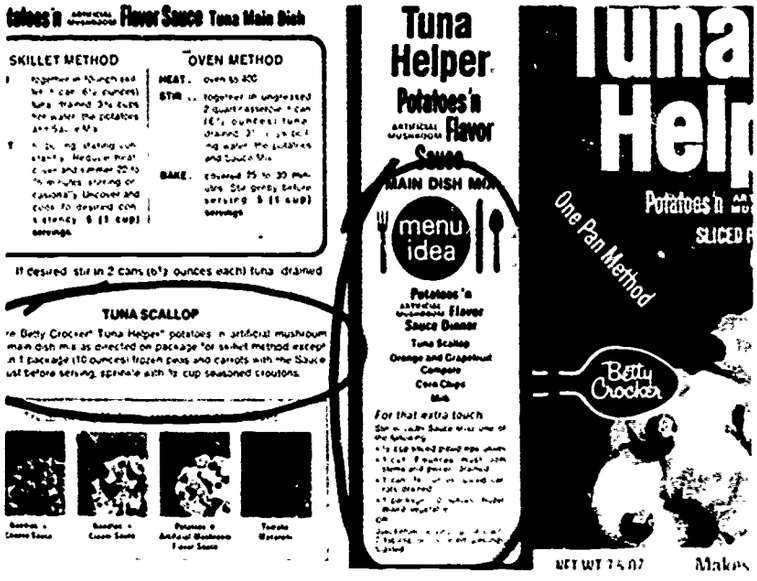


Our newest cereal entry—Protein-Plus contains 25 percent protein, which is more than any other leading cereal.

The Trix cereal package shown here illustrates graphically the necessary ingredients of a good breakfast. A similar message is carried on Sir Grapefellow and Baron Von Redberry packages.



Hamburger Helper is a product which rose to success in the marketplace because of high meat prices. The product was carefully formulated so that with the addition of a pound of hamburger it provides adequate protein for five servings. The side panel of the box also suggests foods to complete a nutritionally satisfactory meal.

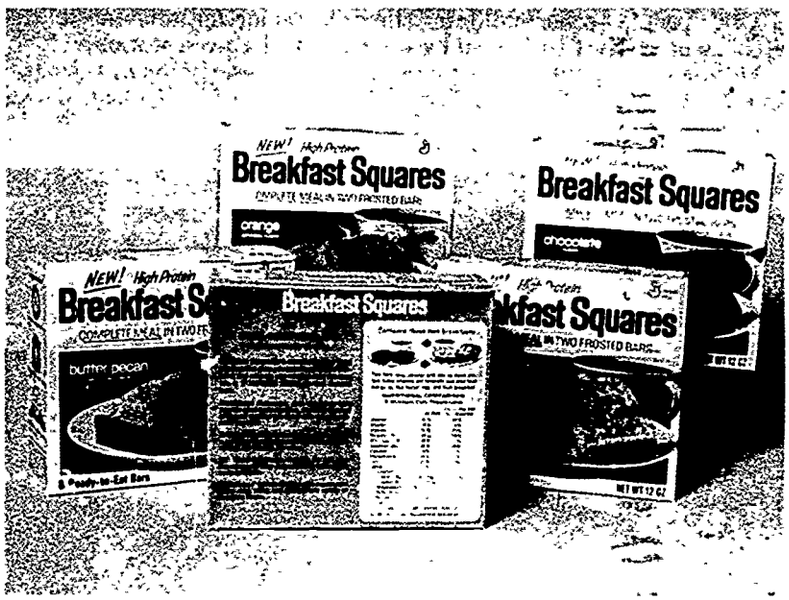


Each flavor of Hamburger Helper (of which there are six) provides a recipe alternate and a menu for a "balanced" meal. A similar product utilizing tuna as the source of protein, also provides the homemaker with balanced menu ideas and recipe suggestions.

Gold Medal flour has been for many years the leading brand of flour. Sacks such as these carried this important nutritional message. It is a guide for planning the meals of the day according to the basic four food groups. Red Band is a southern flour, and the message on that sack back tells what constitutes a good breakfast, and suggests three menus. Together these messages have appeared on more than 22 million flour sacks.

General Mills tries not just to tell nutrition, but to sell it, too, in new products. Breakfast squares are an interesting case in point—distributed in about one-fifth of the United States at the present time. This product is so designed that two squares constitute a complete light meal or one-quarter of the recommended daily allowance of all essential nutrients. It is used by those mobile citizens who start too late to sit down to a good breakfast. It can be carried in a pocket, and eaten anywhere, and I hope you will enjoy the samples.

Our emphasis on good breakfasts includes this brand new frozen product called Wrap-Ups. It contains potatoes or scrambled whole eggs, in a wrapping containing sausage or picnic ham. The serving hints suggest those foods required to provide a nutritionally adequate breakfast.

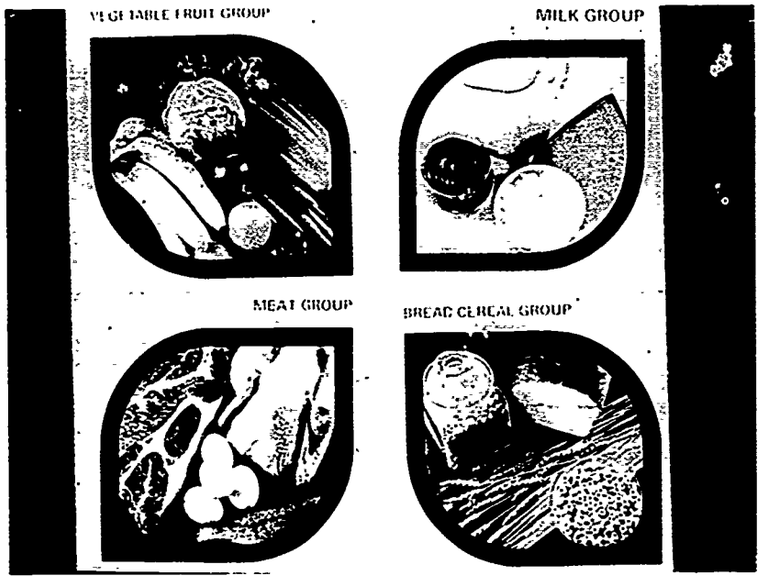


Counterweight is a new weight control program devēloped by nutritionists at General Mills in 1970. It is now available in five cities. While its immediate purpose is weight loss, it also trains in proper eating to maintain good nutrition for a lifetime.

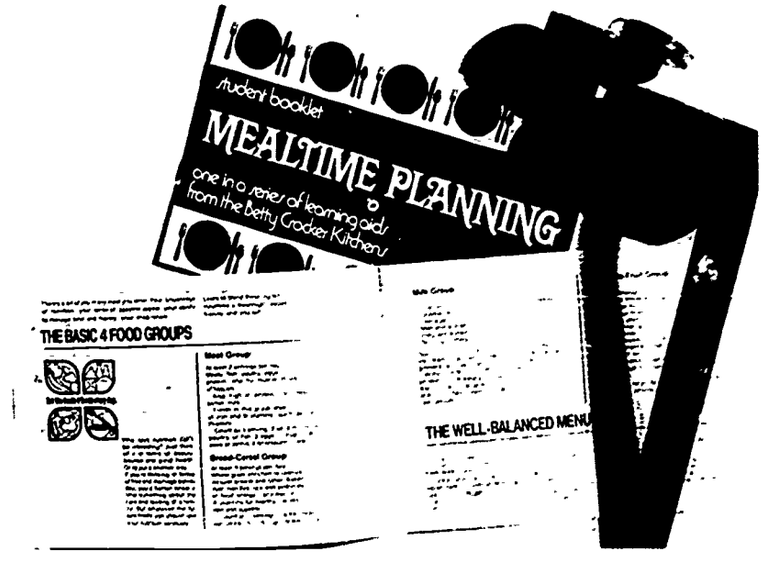
These advertisements headlined "Learn How To Eat, Not How To Diet" really describe the thrust of the program. Every year, more than

110,000 people—schoolchildren through senior citizens—visit the kitchens of Betty Crocker and see a multimedia presentation.

An important part of that presentation is a description of the basic four food groups. This is followed by pictures of well-planned and interesting menus.



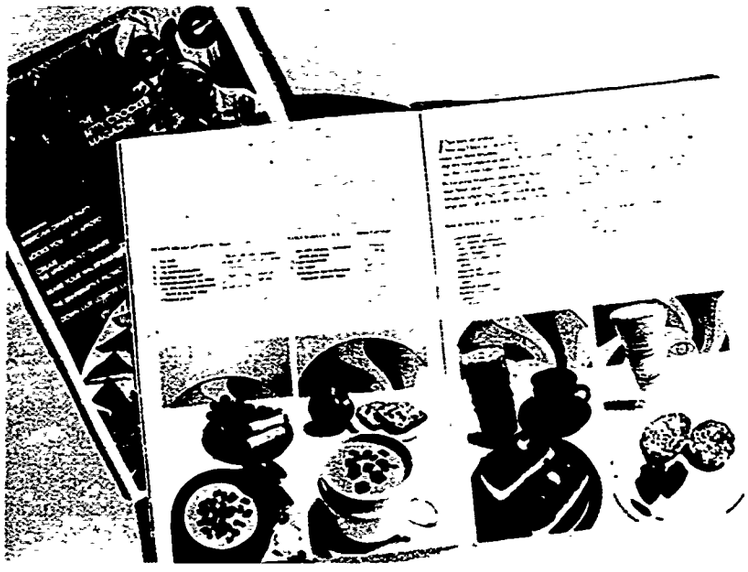
We think breakfast can use a lot of innovative ideas. So we suggest cream of tomato soup over Total for an unusual hot breakfast.



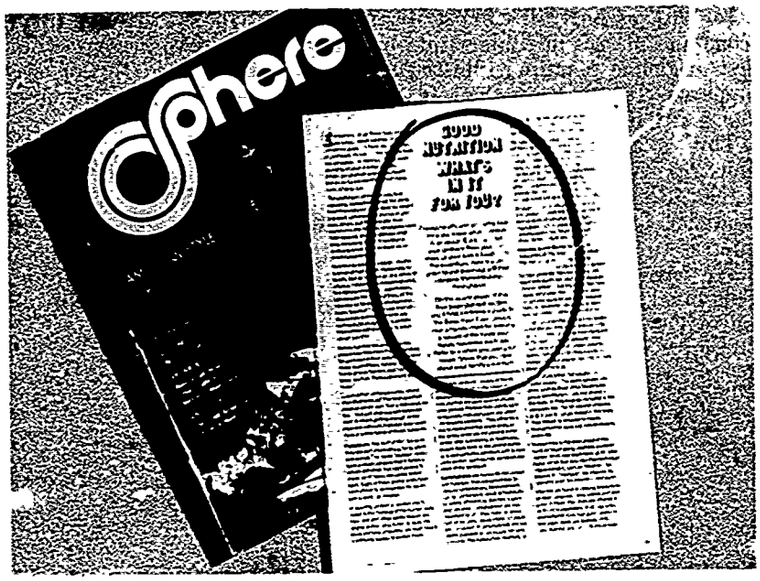
In 1961, as part of a filmstrip program distributed through home economics classes in junior and senior high schools we presented our first mealtime planning filmstrip. In 1971, this up-dated version was prepared. In all, more than 12,000 filmstrips have been distributed, along with more than 1.5 million student booklets.

This is an introductory slide to the basic four portions of the filmstrip. We put a lot of emphasis on breakfast because we consider it the "forgotten meal." This menu includes a peanut butter and jelly sandwich on toast, with a sliced orange and hot chocolate—of real interest to teenagers.

We have used ethnic menus to add interest to our meal planning. This breakfast has an Italian theme—fresh fruit, cheese, a hard roll, and coffee with milk.



Not quite a year old is "Sphere," the Betty Crocker magazine. It is produced under franchise from General Mills by Vertical Marketing of Chicago. It is a woman's interest magazine with prime emphasis on foods. Circulation is now 500,000 a month. "Sphere" has featured a number of articles on nutrition and applied nutrition. This one on breakfast with unusual breakfast menus and recipes, all nutritionally balanced.

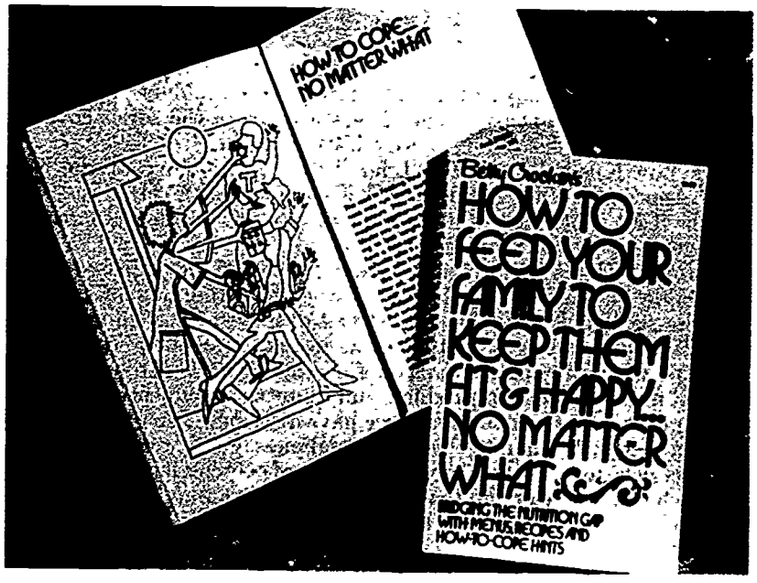


Here's an article from *Sphere:* "Good Nutrition—What's In It For You?" and overleaf is this guide to good meal planning with a tear-out sheet to be used by the homemaker in planning her own menus.

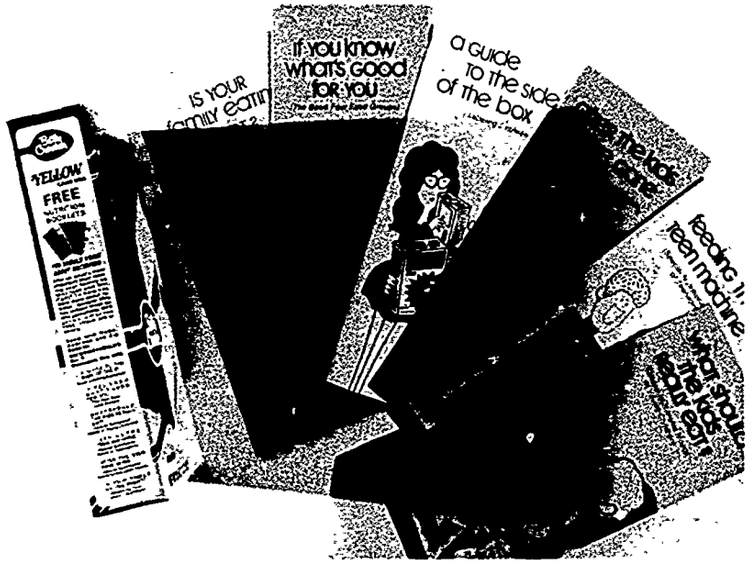
"Those Little Brown Bags" refer to lunches for children—lunches to take to school that are nutritionally balanced and teach good food habits.

Meat is always an important subject of great interest to homemakers. And this story on the new, lower-fat pork has been very well received. This article from the current issue features a meatless menu carefully checked for adequate nutrition by our Nutrition Services Department. It is particularly timely in view of today's high meat prices.

In the past 1½ years. 24 articles dealing with nutrition have been prepared by General Mills and published in newspapers with a circulation of over 52 million. In the line of Betty Crocker cookbooks, there are some 14 titles—with 6 more in current manuscript stage. Since 1970 the inside back cover of each one has carried this story of the basic four, with a cumulative total in the millions.



In the Betty Crocker department we're very proud of this paperback book, "How To Feed Your Family To Keep Them Fit and Happy . . . No Matter What." It treats nutrition in a down-to-earth easy-to-read fashion relating nutrition information to the daily problems that the homemaker faces. This book was featured at a reduced price on Total cereal packages, was used as a bonus book by the Cookbook Guild of the Literary Guild, and was also used as a free premium by Western Publishing in their spring cookbook promotion. All in all, we have at present sold out our original printing of 154,000 copies.



Inspired by our paperback book are the above folders produced by Nutrition Services Department. There are six in the series covering such subjects as: "Is Your Family Eating Right?"

"If You Know What's Good for You," is the story of the basic four. Another, "What Should the Kids Really Eat?" Here is "Feeding the Teen Machine"—the story of the special problems of feeding teenagers during their rapid growth period.

"After the Kids Have Gone"—the problems of the empty nest, and "A Guide to the Side of the Box"—the story of nutrient labeling.

These six booklets will be offered free of charge on 25 million General Mills food packages, such as this cake mix package.

I hope you will realize from this story that General Mills dedication to good nutrition both in products and in nutrition education has been of long standing. Over the years, we have distributed some 425 million messages. You may add to this additional messages distributed by such trade associations as the Cereal Institute, of which General Mills has been a charter member and to which we subscribe annually.

Television commercials can also tell the story of good nutrition. Here are three of our adult-oriented cereal commercials for Buc*Wheats, Protein-Plus, and Total. All of them stress the importance of a good

breakfast and the part that cereals play in the planning of a good breakfast.

[Reel of commercials.]

I hope you will be interested in this next film portion. It is not a commercial. It is, instead, a 2-minute clip from a cartoon show for children featuring Tennessee Tuxedo and owned by General Mills. Tennessee Tuxedo has been seen on the airwaves for about 10 years by 2.5–3 billion viewers. At the present time, these shows are being offered in 33 markets. Many educational subjects have been featured, and this one is on food.

[Reel of Tennessee Tuxedo.]

The chairman of the board of General Mills, James P. McFarland, has stated the policy of the company in these words: "General Mills food products will be wholesome, will follow appropriate nutritional guidelines, and will be consistent with the needs and desires of the consumer."

Just as we seek to fill nutritional needs as they become apparent, the company also seeks to provide honest nutritional information about its products and to help people improve their dietary habits. We believe that profits measure and reward effective and efficient performance in meeting consumer wants and needs. Profits enable us to meet our obligation to shareholders and to implement the growth of the corporation. Thorugh them, we also gain the means to discharge our broader responsibilities to society in programs such as I have illustrated here today.

Thank you.

Heavily Sugared RTE Cereals . . . Good Nutrition?

Senator McGovern. Thank you very much, Miss Bates. I think we all know that General Mills, through the Betty Crocker program, has stood for good nutrition over the years, and the presentation of these materials that you showed here today, is most impressive.

These hearings concentrate considerably on heavily sugared food, breakfast foods, and natural foods. We have had testimony from distinguished dental experts about the problem that children, turning to food of this kind, have.

What is your opinion of some of your own company's cereal products? Sir Grapefellow looks and smells like candy. Do you really consider that a good nutritional product for children and a good nutritional educational approach?

Miss Bates. Senator McGovern, the breakfast that a child does not eat does him no good whatsoever. We do know that children eat breakfasts that appeal to their tastes, and these products do provide a good nutritious breakfast when they are eaten with milk. You have already quoted the figure that 94 percent of cereals are eaten with milk, and we believe our own findings verify that figure.

To our knowledge there is no published evidence [1] available that indicates that presweetened cereals or cereals in general cause dental caries, which is one of the thrusts of our investigation. This is not surprising as sugar consumption from cereals is only a small portion of sugar intake. Presweetened cereals account for less than 2 percent of

[1] See NE 3. Dr. Shaw's testimony, pp 283–288.

total sugar consumed in the United States, and less than 3 percent of total sugar consumed by children.

Senator McGovern. I was wondering—as I watched your advertising here I noticed you stated on the cereals—Total and Buc*Wheat, and I forget the other one—I personally find them very appealing cereals, and I consume large quantities of those cereals. Why do you direct the advertising of those more nutritional cereals to adults? Couldn't you sell that in skillful advertising to children? Is it really necessary to emphasize the sweetness in order to sell to children? I have the feeling that what goes on—your television ads on the heavily sweetened cereals aimed at the children—is a fight between the mother and the child when you get to the supermarkets, as to what is going to come off the shelves.

If Total and Buc*Wheats and some of these other products are more desirable, why couldn't the advertising budget their television time so that these products are advertised on the children's programs?

Miss Bates. We believe these presweetened cereals are good nutritious foods. They do appeal to children's tastes, but you must realize that children watch other television programs besides the so-called Saturday morning shows, and they see other television commercials as well.

The message that we have on the presweetened cereals is always set in the context of a good breakfast. We are not recommending the use of cereals and milk alone. We are recommending it in the context of a good breakfast, and we believe that these cereals encourage children to eat a good breakfast.

A Paradox in Realism

Senator McGovern. Miss Bates, in some of the printed material—I am referring to one book entitled "Meal Planning For Young Children." Mr. Choate, who was before the committee, quoted from the book as put out by General Mills. I think it is an excellent book, and this is one of the things that booklet warns against:

> Watch the teeth. Use sparingly foods high in sugar. They take away the appetitite for more basic food, provide only quick energy and encourage tooth decay. No coaxing is needed to get children to eat candy, cookies, cake, or take carbonated beverages. Teaching a preference for other types of food must begin in the highchair age. Offer sweets only at the end of the meal.

That is a caution in one of your General Mills products.

"The same company," Mr. Choate says, "spends millions of dollars in advertising to children" and he quotes one of your ads that is aimed to children on television: "Mirror, mirror on the wall, whose cereal is the super-sweetest of them all? Is it my Count Chocula, my super-sweet cereal? Chocsweet is for chocolate flavor."

Don't those two pictures seem to be in conflict?

Miss Bates. The booklet you referred to is an excellent one, and he has taken one paragraph out of context. Absolutely everything that is said in that book is accurate. I think it is a correct statement.

Senator McGovern. I think it probably is, but the advertising on television encourages the children to use the supersweetest cereal of them all. How does that square with the booklet? That is the point.

Miss Bates. That squares with getting the children to eat breakfast.

The number of children who eat cereals—will eat presweetened cereals—are much lower than you would probably think.

Let me tell you: 54 percent of all children eat no presweetened cereal at all anytime during the week, and this is a survey, incidentally, of the Marketing Research Corp., data that was referred to earlier by representatives of the Kellogg Co. Then cumulatively 73 percent eat cereal no more than once per week; 84 percent eat cereal no more than twice a week. There is no indication of large or unnecessarily large amounts of these cereals eaten at times other than at breakfast with milk. With fruit, with toast, it becomes the basis of a good nutritious breakfast, and it does persuade children to eat that nutritious breakfast, and we think this is most important.

Senator McGovern. I want to emphasize, Miss Bates, when we are interrogating you on these matters it is not in any way intended to underestimate the value of what the company is doing. I am sure there are very valuable nutritional gains that have been made because of the efforts of General Mills and other companies to encourage children and all of us to have breakfast at all.

I think a cereal breakfast can be a very nutritious breakfast, but what the committee is trying to get at is some of the practices—it does seem some improvement could be made whereby we could use the techniques of modern advertising to get children to move into nutritional habits that will stay with them for the rest of their lives.

You get youngsters dependent on a highly sugared diet, and you have a campaign for people over 30 encouraging them to pass up these sweet foods.

I think the advertising budget could be handled more wisely in achieving nutritional standards.

Miss Bates. Don't forget that our cereals—the sweet ones you are referring to—are fortified with vitamins, and with iron, and as such they do contribute substantially to the diet of those who eat them.

The other sweets that were referred to in that bo[illegible]t tend to be the snack sweets which do not have fortification, and all of this must be looked at in reference to the foods eaten throughout the day.

A sweet cereal eaten at breakfast gives energy and satisfies and starts the child toward a good active day. This might not be true about a snack eaten just before dinner which may discourage the appetite.

STATEMENT OF SENATOR HUMPHREY

Senator Humphrey. The more intelligent, the more educated they are, the worse they eat breakfast. I watch the staff around Capitol Hill. I come early in the morning. We have college graduates, people that are supposed to be professionals, and they go downstairs and pick up a roll—that you wouldn't feed to a dog—and get a cup of coffee, and that is their breakfast.

I scold them, I scold my own staff this way. I say "Why don't you have a good breakfast?" I get up and I have bacon and eggs, cereal, bananas, milk, and I feel a lot better than most people at work because of it.

I have had people say to me, "How can you take the campaign?" I say "Well, I eat breakfast." I don't believe in all this business of coming up in the office having a cup of coffee and a roll.

What is really bothering me, is that I don't think the advertising goes to the right people. You get a college degree, and you generally eat worse for breakfast.

The people who eat a good breakfast are out in the country. What they do is, they get up in the morning, and they have a big breakfast.

I am not being prejudiced in favor of farmers, but I watch the people in the offices that are so-called professionals, highly educated people who deliberately abuse their bodies, starting out the day without having a proper meal. Everything you say about the early morning meal is true in terms of getting off to a good start. From there on we can argue whether or not we ought to be following this or that diet.

I am concerned about the excess sugar in breakfast foods as Senator McGovern has indicated, and I really believe the companies ought to look at it very carefully and do something about your advertising as well as about the overuse of it. I think there is going to be more and more evidence coming in that there has been excessive use of sweet cereals. That is my judgment.

Most of the Senators on this committee are not grandfathers, but I am a grandfather, and I have six grandchildren. One of the biggest problems I have—which I would like to have you solve—is how to keep on hand all these breakfast foods that they want. When they come to our house in the summer, my wife, who has brought up a good family and has this good system, says "You take care of the grandchildren for breakfast." Well, grandmother feeds them something that they ought to get, but they like Kaboom. I don't know anything about Kaboom, but my granddaughters won't eat anything else but Kaboom. It is hard on grandfathers. You have got them sold on Kaboom. [Laughter.]

I thought I would add just one thing. Everything I have seen here is directed toward the middle-class, well-educated Americans. It is true that some of the worst practicers of nutrition are among the better educated people. I don't really believe two or three martinis before dinner helps your nutrition, and I am not disapproving of it, but I just don't think it helps you. I think it hurts your teeth a damn sight more than sugar. [Laughter.] By the way, it adds more weight, a lot more weight.

I really believe there is a difference between the adult advertising and children advertising. I think your point is well taken. When you are over 30, protein is terribly important in terms of weight, but as a child protein is terribly important in terms of basic structure, physical health, mental abilities. We know a great deal about protein and the learning ability of children, the health of the brain, so to speak. I would think somewhere along the line in advertising the message ought to get through. How do we educate, how do we use the television to get to the children in the ghetto? How do we use the television to get to the undereducated with a real message and the mother who has no education? There are 12 million illiterates in this country that can neither read nor write, in this great America, they are not going to be able to read that fine advertisement.

Corporations Must Sell Education

I am interested that the corporations take on the job of real nutritional education as well as personal hygiene. All these talks to the

affluent, well, they are going to eat the wrong foods anyway. A goodly number of them are, and some of them are going to right themselves because they have learned.

What about this great group of people that do not read—and if they could read maybe do not read—I am not being critical, it is just a fact of life. What about these young mothers, or mothers any age that really do not read recipes? I have held hearings in certain segments of Congress and I am finding out they just don't read the recipes. They have no background that gives them any indication what vitamins and a balanced diet are about. How does a commercial company sell the product, but also sell an idea? That is what I am interested in, and that is why I want to be on this committee. I think the corporations of this country have got to use the television for education.

We know what "Sesame Street" can do for children. It is incredible what the program has done for children. Yet we persist in this country to not using the message of health and nutrition on the same basis. Do we have to rely on public broadcasting, or are we going to have the companies, the great corporations take this on as a part of their economic and social responsibility? I would like to know what you are doing in that area.

Miss BATES. General Mills has sponsored a number of educational programs for children on the network such as "Take a Giant Step" and "Mr. Wizard." You have seen a clip from "Tennessee Tuxedo" which has been on the air about 10 years now. We have also included some other prize-winning programs which I am afraid might or might not interest the group that you are talking about. That includes "Robinson Crusoe," "Treasure Island," and others. The 30-second commercial that we use makes it extremely difficult to do more than establish a name and show a food in the context in which it should be eaten rather than as a lesson, per se. It is hard to do more than establish the name in 30 seconds. That is why we use the back of the box.

However, we have used it for some other things that I did not mention to you. I think most of you are aware of "Katy's Coloring Book," the Government-produced program on drug education, and we have had that on millions of packages. We are now at the point where we are thinking of producing this coloring book, which is also a Government book, both in Spanish and English. It is a coloring book directed toward good food, what food you should eat every day. We think this might be a promotion of a simple game. That may be a way to spread that information.

Senator HUMPHREY. We found in the disposal of surplus commodities great waste because of the lack of knowledge on the part of recipients as to how to reuse them.

What I am trying to say is this: You are a very well educated woman, and members of the committee have had the privilege of college education or at least a broad experience in some public or private life, but we have millions of people in this country that are really the victims of the lack of education. What I am interested in is at the corporation level. I know you have to make a profit, and I want you to, but how about getting a message they can get from the electronic media? The print media will never get it to them. They will never read it. There is a big market out there too. You know that.

I think it would be a good idea to stay at home on Saturday mornings sometime and watch the cartoons. I like "Underdog." George [McGovern], you and I also like it. [Laughter.]

What is the other one, "Roving Runner"? Anyway, those commercials in between are tremendous. They do sell these cereals. There is no doubt about that. I am sure that is why when you go to a supermarket in low-income areas and watch what they are picking up, they are picking up large amounts of the sugar cereals.

I just want my good friends in corporate industry to really start to educate people about good nutrition through the electronic media, and I think it can be done. I think you can educate people how to take care of their home, how to take care of their health, through the electronic media. I have been checking on it a little bit.

I watched television last night, and there was not a program fit to watch. The same old pattern of shooting down cowboys—Sunday night, I might add—a commercial for so-called entertainment.

Corporate Pooling of TV Nutritional Education

I believe it is imperative that we use the corporation structure to get our messages on better neighborhood, better health, better nutrition, and not to depend on it as something to be done by OEO or some of the Government programs. Anything you can do on that as a company I think will be very helpful. I would hope that somebody would take the lead amongst the corporations in pooling a percentage of your TV ads for this kind of nutrition education rather than Kellogg doing something on their own, and General Mills doing something, and General Foods doing something else. I would hope that they would have an electronic type of program, a percentage of which would go into a noncommercial type of education. We call it advertising, but it is really education. I know you do a lot of it, and I appreciate it, but I think there is so much that can be done over and beyond 30 seconds. You really can't do very much in 30 seconds except say "Hello". I think one of the curses today in the whole business of information is trying to tell people in 30 seconds how to take care of their bodies, how to take care of their homes, and all of that for one reason; namely, you get money out of it in the advertising rates. I don't believe that is the way you can save this country's health; not one bit. I think something ought to be done beyond that.

Miss Bates. We are certainly willing always to review our advertising policies, and I think you might be interested to know that Dr. Hayden of the Cereal Institute is here today. The Cereal Institute is the association through which our cereal companies distribute materials to schools, generically, and perhaps this could be something his organization could consider.

Senator Humphrey. I think it would be interesting to find out how much is used in schools. I don't mean to underestimate the importance of print: the boxes, the magazines. I think it is important, but we are living in an electronic age whether we like it or not, and youngsters today get most of their information, outside of their practical experience at home or on the street or in school, outside of that, from the electronic media. That is why these packages sell so well, as I said awhile ago, particularly in the low-income areas. Thank goodness you do fortify them. That is right.

I think you made a good case about the sweetened cereal and the nutritional value. Again, I take the broader approach. You are a home economist specialist, and that goes beyond the food. Quite obviously the total environment affects the health of the child, and we have had some very good lessons in the breakfast program that Senator McGovern is very familiar with, what it has meant in learning, what it has meant in school attendance, and health.

We also have a correlation between good nutrition and avoidance of drugs. I think it is time we start to get more medical evidence on this. It is true that a good nutritional breakfast and lunch makes children less prone to drugs; the cost of the breakfast or lunch is incredibly cheap. I would like to have more evidence on that from our specialists.

Senator McGovern. Thank you, Senator Humphrey.

Senator Schweiker. First, I would like to compliment Miss Bates and General Mills on the nutritional advertising position that they have taken. I think that some of the products, Protein-Plus, and Total, certainly are good steps in that direction. I would agree with Senator McGovern: I would like to see those cereals emphasized more because I think they are a very constructive effort to a very important situation.

We are delighted for your being here and for your efforts.

I want to say to Senator Humphrey that I do not have to appoint a subcommittee. I have five children—ages 3 to 15—and I see the Saturday morning shows, the TV commercials, and I think he made a very valid point. I think if you are not doing anything on a Saturday morning, it is worth looking at it.

Another point, I also share the Senator's fondness for sugar. I have an affection for sugar.

Notwithstanding that, I think I should add something on a sobering note which I think our committee would be derelict if we did not at least make cognizance of it for the record. I have here an article from the Medical World News of February 12, 1971. The article's title asks the question "Sugar: Dangerous to the Heart?" with a subcaption ". . . and some research now points to an intriguing link with atherosclerosis." I would like to cite one paragraph from it and include the article in the record.[1]

Dr. Yudkin, both M.D. and Ph. D., is professor of nutrition and dietetics at Queen Elizabeth College of the University of London. From his quiet campus on Campden Hill in Kensington, the biochemist-physician has raised a storm by stressing that deaths from coronary heart disease, which have gone up dramatically in the past 50 years, are more closely related to increasing sugar consumption than to any other dietary change. From the 4-lbs. a year he ate in 1750, the statistical Englishman increased his consumption to about 25 lbs. in the 1850s. Today it's about 120 lbs. a year, or 2.3 lbs. a week.

Again, I am not quoting this as a final argument. There are more medical citings here. It may be an expensive taste that causes all of this.

Senator Humphrey. Let me join in commending Miss Bates on her testimony. I surely appreciate the work that is being done.

I will just encourage this great company to take the initiative in attempting to pool the segments of the advertising budget through the food companies for general nutritional education. I think it would be excellent. It is what we call institutional advertising. It is not sales advertising. It could be very, very helpful. You do it individually and

[1] See Appendix, p. 525.

it is very well done, but it seems to me we need a repetition, to get on a course and follow it meticulously.

I want to say to my friend, Mr. Schweiker, I think I am aware of the sugar matter, but there was a time- we are just living in a time when you don't know what is going to kill you first.

My old friend Ansel Keyes from the University of Minnesota had me half scared to death about butter and milk and everything that is going to put you away: Cholesterol. Then you find out if you drink coffee that gets you; smoking, that is worse. I'll tell you what is really good for you—exercise. [Laughter.]

Miss BATES. I think the answer is what all of you have said, and that is moderation in everything is very important.

Senator MCGOVERN. Thank you very much, Miss Bates, for your appearance.

The committee is in recess, to reconvene at the call of the Chair.

[Whereupon, at 12:25 p.m., the Select Committee was recessed.]

APPENDIX

ITEM 1—SUBMITTED BY WITNESSES

FROM THE KELLOGG COMPANY

THE NEW RESPONSIBILITIES IN TODAY'S ADVERTISING CLIMATE

An address by

J. E. Lonning, President and Chief Executive Officer,
Kellogg Company

Before the

AMERICAN ADVERTISING FEDERATION

15th Annual Government Affairs Conference

January 29, 1973

Statler Hilton Hotel, Washington, D.C.

Thank you, Mr. Dodderidge for that generous introduction.

I certainly need it because my name isn't exactly a household word.

I have the honor, however, of representing a company that *is* a household word . . . Kellogg's!

We wish "The Best To You Each Morning". . . *every* morning . . and especially *this* morning—the morning of the keynote session of the American Advertising Federation's 15th Annual Government Affairs Conference.

It is a pleasure to participate in the Conference. I salute you for your excellent work and challenge you to continue your efforts at the local, state and national level.

Mr. Dodderidge, distinguished guests, ladies and gentlemen of the advertising industry.

While I say . . "good morning". . . in that good old Kellogg way . . you and I know all too well that mornings today are not what they used to be.

For you in the advertising industry . . . and for those of us closely associated with it, and dependent upon it . . . those once sunny skies are becoming very threatening. A strange wind is rising, and it's *not* a good wind. We awake *these* mornings and go to work with a sense of apprehension and uncertainty.

And well we may . . . for let's face it . . . advertising, as we know it today, is in danger.

It is being attacked on all fronts by professional consumerists, theorists of the "new economy," and by many here in Washington . . . both in Congress and in the regulatory bodies.

Make no mistake. Our critics clearly want to change the workings of this great industry, and when the *freedom* of advertising . . . that is, the *right to advertise* . . . is threatened, the four building blocks of our great American economy . . . mass production, mass distribution, mass communication and mass consumption—are also threatened.

Now, I hasten to add an important caution here.

Let's not make the mistake of looking upon our opposition as one homogeneous band of fanatical do-gooders and wide-eyed theorists. We must realize that among those forces of opposition are many right-thinking people—men and women of good will—who have sincere and thoughtful questions about advertising. And, let us also admit, questions *can* be asked.

But the point remains: there has emerged, or rather there has *exploded* in this country, a deep mistrust of advertising . . . and *we need* to do something about it.

Now, I am *not* going to attempt to lay before *you*—the Advertising Industry—a plan that will suddenly and miraculously bring Understanding and Light to our adversaries . . . and an end to their differences with us. I'm sure you didn't hope for *that* today. The subject of Advertising, vast enough on the surface, is profound in its implications. And I have no magic potion.

Neither do I have a counter "Counter-Advertising" Program to submit.

And I certainly won't join those well-intentioned laymen who say . . . "*You* are Advertising Men. *You're* articulate. *You're* persuasive. You are good at advertising for others. Now do some for yourself."

While this *may* be a practical approach, I believe the *best* and *most practical* tactics for you in the Advertising Industry are *single* and *individual*. *Not* collective. You . . . company-by-company. *Not* you . . . like an army.

To support this thesis, I'm going to tell you about the philosophy of *one* company . . . Kellogg's . . . what it is thinking about, what we have done . . . and are trying to do . . . to meet our advertising responsibilities in today's climate.

I'm going to speak briefly about our products, and our advertising policies, and I'm going to relate these policies to the actions we are taking *today* in response to this new consumer environment. I hope in the process that I can stimulate your thinking . . . and give you an idea or two for your own company, your clients or those with whom you work.

Let me begin by saying that the consumer movement encouraging better nutrition is not new to Kellogg's. Our Company has always welcomed this movement. In fact, we were among its early pioneers.

Sixty years ago, our founder, W. K. Kellogg, noting the heavy breakfasts eaten in those days . . . with high levels of fat and calories . . . saw the need . . . *as a consumer* . . . for a convenient food that would be light, tempting to the appetite, yet nutritious. He found the answer, of course, in ready-to-eat cereals.

Little did he dream that his good idea for a light, tasty breakfast food, which caught on like a prairie fire, and grew like professional football, would some day be castigated because it didn't contain a whole, full, 24-hours worth of nutrition! (Which obviously it was *never* intended to contain.)

And, little did he dream that his cereals, which are *even today* found on *hospital* menus, would someday be maligned as "empty calories."

Well the *facts*, and I *underscore* the word facts, clearly state that today a typical Kellogg cereal product, like Corn Flakes, contains about 4% of the day's calorie requirements, and yet contributes approximately ⅓ of the day's minimum requirement for eight essential vitamins, plus useful amounts of protein and minerals. Many of the ready-to-eat cereal products provide substantially more than half of the total nutrition in the typical cereal and milk serving.

And we at Kellogg's continue to be *proud of our products*, their quality and, the nutrition they contribute to the welfare of our populace.

And, incidentally, one important thing we've learned from being on the hot seat in recent years, is that the consumer isn't going to be easily duped by opinions from headline seekers, either. The acceptance our products have earned with the consumer, is going to weather the storm.

For example, you might be interested to know, that in spite of the unfounded criticism of breakfast cereals, the cereal industry has continued to show a healthy, normal, pattern of growth.

Obviously, consumers want solid information, not unqualified opinions, and will continue, as they always have, to respond to quality and value in the products they buy.

Next, let me say that *Kellogg's is equally proud of its advertising.* We *know* that our commercials are honest and tasteful.

However, we agree 100% with many responsible critics who say that there is no place for deception in advertising. And that in today's environment, advertisers must re-evaluate their advertising . . . practice self-regulation . . . and be certain that *every* second of *every* commercial is completely honest. It seems to us that *only* in this way can we as an industry, guarantee our freedom to advertise our products.

Now at this time, I'd like to take thirty seconds to show you a commercial we are currently running. I feel it demonstrates this philosophy of honest and truthful product advertising.

As you know, we manufacture and package individual servings of our products and assemble a popular selection of them in Kellogg's assorted packs such as Variety. On a *per-serving basis* these packs of individuals are *naturally* more expensive than the standard package sizes, because it's much more expensive to package them this way. And since our customers are paying more for this convenience and variety, we want them to know the facts about it. Let's take a look at this commercial . . .

FILM—KELLOGG'S ASSORTED PACK COMMERCIAL

We're in the second year of featuring this T.V. commercial. Has it caused assorted pack sales to plummet downward? Did the consumer resent the facts she gained from this commercial? Absolutely not. Apparently consumers respect and appreciate a sincere and honest advertising approach.

* * * * * * *

Now let's talk for a moment about advertising to children.

The viewpoint that *all* advertising to children is bad and should be "outlawed" is based on some strange assumptions.

It assumes that parents have no influence, no control and no value as models for their children.

It assumes that to want things as a child is not normal and is bad.

It assumes that children can be "seduced" into wrong values by advertising, and that this can be done in spite of the other influences in a child's life: family, friends, church, school, reading, and just plain experience and innate human values.

It would deny to children the experiences that help them prepare for the day when they're on their own with decisions to make, livings to earn, money to budget, values to establish and independent lives to live.

And finally, it ignores the grim realities of the market place. To contend that one need only make some extravagant promise to a child in order to make him a slave to one's product can only seem ludicrous to anyone who has experienced the futility of trying to justify advertising support of products that do not enjoy consumer acceptance.

Much *like* adults, children have very specific wants and preferences when it comes to cereal products and we at Kellogg's feel justified in advertising our many different products to children.

But it's not enough to feel justified in our *right* to advertise to children or in our ability to execute that advertising.

It's obvious to us that companies, like ours, must consider this a special privilege that has continuing responsibilities. Children *are* special people and deserve special treatment. Our advertising to children must consciously reflect this commitment.

For example, we continuously research our children's advertising campaigns with children *and mothers*. Mothers have indicated that our advertising is acceptable, and often very entertaining for their children. Importantly, they approve of the product message we're bringing to their children.

We also subject our advertising to research conducted by firms outside of our own Company, or our agency's facilities, in order to obtain other opinions and evaluations.

In addition, we talk to our critics to explain what we're trying to provide in our products and our advertising, and we have contacted many of the top nutritionists at major universities. We've also talked with consumer activists, some of whom are our most severe critics. More often than not, we reach a meeting of the minds. We feel *they* are better informed. And we learn things from them.

Similarly, we spend a great deal of time listening to the critics of children's television programming. We religiously attended the FCC hearings here in Washington, and we were represented at the ACT conference in New Haven last fall. In this regard, we feel it is important for the advertising industry to *acknowledge* that there may be problems with the current children's programming situation.

For example, we feel there is room for more creative, entertaining and informative television material for children, more diversity, and more "G rated" programs for the whole family, and we are actively talking with the broadcasting industry and their suppliers to stimulate interest in creating this type of programming.

Let's be realistic about the children's programming situation: advertisers are going to have to take a more active role in this area to insure that the programming bill of fare offered to children reaches a state where all of us can be proud of our program sponsorship.

I mentioned earlier that Kellogg's is taking several steps that we feel will contribute to the public's welfare.

There's been a lot of discussion in recent years about malnutrition and the lack of proper diets in this country.

Critics of advertising have said, what's missing is *nutritional education*. They feel that people need to become *aware* of their diets, and to become *informed* of, and to *believe* in, the fundamentals of good nutrition.

Breakfast, almost all nutritionists will agree, is a very important meal in the day, especially for children. A child's performance in the late morning hours is markedly improved if he has had a nutritionally sound breakfast. Yet studies show that about one child of five, leaves home in the morning *without* an *adequate* breakfast, and that six percent of all children go off to school with *no* breakfast at all.

Since our business is breakfast: we feel this is the area where we should contribute . . . and can best contribute . . . to the nutritional education and well-being of the nation.

Here briefly are some of the things that we have done . . . and are doing . . . to bring about a better understanding of nutrition as it relates to breakfast.

For years we have been stressing the need for a nutritionally balanced breakfast—and not just cereal—but cereal as a part of a *complete* breakfast. Today every one of our television commercials, whether directed toward adults or children, shows our products as part of a nutritionally *complete* breakfast—juice, toast and spread, milk and cereal.

You may have seen a Sugar Frosted Flakes' commercial last fall, where Tony the Tiger ran for President on "The Better Breakfast Platform." This commercial stressed the importance of a complete breakfast and spelled out what a better breakfast might be.

I'd like to show you how this was done:

FILM COMMERCIAL—"VOTE FOR TONY"

Some have charged that Tony the Tiger is being used to mislead. After viewing the commercial I believe you will agree the message is positive.

In addition to this television activity, we annually schedule a print campaign that talks about better nutrition at breakfast, and again presents our products within the context of a nutritionally complete breakfast. We don't need to talk about nutrition at that length, of course, but we're doing it.

We distribute several hundred million packages a year, and what more perfect educational vehicles could there be than the millions of cereal boxes sitting right there on millions of breakfast tables? So, we include on our packages, a message on the importance of eating a nutritionally complete breakfast.

For fifty years we have been distributing nutritional information to the schools. This information does not cover breakfast only; it covers the whole subject of balanced diets and good nutrition. We employ full time home economists and dietitians to handle this, as part of our program.

In a few weeks, we will add something new to our nutritional education efforts . . . something that we believe, is unique to the food and advertising industries. It's a pleasure to announce here for the first time, an extension of these educational efforts. A new program which we consider will make a significant contribution to better nutrition. This effort will be "The Good Breakfast Campaign" . . . a television campaign aimed primarily at children with the goal of educating kids on the need for breakfast.

Initially, we are producing two sixty-second messages that show (in a way that kids can understand and relate to) why it's important to eat a good breakfast. And we will show in this message that there are a variety of good tasting, appetizing breakfast foods to choose from. We will no focus on a cereal breakfast, although we certainly will—and are proud to—include cereal in this message, because it belongs there. One of these messages is designed to tell young children about the importance of eating a good breakfast, The second one is specifically designed for schoolage children and their mothers.

In addition to absorbing the production cost of these announcements, we are going to take media dollars normally assigned to brand advertising, and purchase positions on television. While this advertising is public service in nature, we want to make certain that these messages get aired and are seen by children across this nation. Yet the only mention of Kellogg's is in the closing credit line.

We intend to schedule these better nutrition messages on Saturday and weekday children's programming. And not just once in a while. Starting this spring, we will schedule them:

Every week, for the balance of the year,

Nationally, on all three television networks,

And we will see that they are seen on *every* Saturday morning children's show at least once.

Further, to reach pre-school children, they will be scheduled frequently on weekday programs, such as Captain Kangaroo.

And finally, we will schedule these announcements on network programs where parents can be reached, such as the "Today Show."

In summary, over the course of the year, these messages will reach virtually *every* child in this country at least once, and most of the kids will see them several times.

Now I'd like to stop for a moment to show you one of our Public Service messages.

FILM COMMERCIAL—"NO BREAKFAST DROOP"

We're very proud of this message, not just because we put it together, but because we think it will be effective.

Now there is an important final point to be made here . . . and that is this: *"That" television message would not have been conceived of ten years ago.*

But there it is today. It's unique right at this moment. But it won't be unique long—and it better *not* be. We at Kellogg's hope that many other companies will do something similar . . . because, like it or not, you *and we* are all . . . *now* living in a new and different climate.

Whatever we individually think about it . . . whether we individually think we deserve it or not . . . even though we may individually think they're burning down the library because one book was bad . . . even though we resent the intemperateness and injustice of some of the attacks on the business of Advertising . . . we are living in a new and different world.

And *We Can't Go Home Again!* Because home isn't there any more.

In conclusion, I say again that I hope what I have said here today may give you an idea or two. But, more importantly, I hope it may help to form a resolution for each of you to do *something*. Because in the long run, we are going to be judged collectively . . . as an industry . . . by what we do *individually*.

So, let us resolve individually to do something—and do it now.

FROM GENERAL MILLS, INC

Publications Available From General Mills

The following publications were submitted for the committee files; they are available from General Mills, Inc., Minneapolis, Minn.:

1. Nutrition Guide—Proteins, Minerals, Vitamins, Calories. A26398.
2. Story of the Cereal Grains, The. 1969 A22749.
3. Golden Good Cooking—With Betty Crocker's Saff-o-life Safflower Oil. 1969. 1970 A24008.
4. Cereal—One of the 4. 1970 C72.
5. If you know what's good for you (The Basic Four Food Groups). A27300.
6. What should the kids really eat? (Special Nutritional Needs of Young Children). A27326.
7. Feeding the teen machine (Special Nutritional Needs of Teenagers). A27327
8. Guide to the side of the box, A (Food Labeling Explained). A27297.
9. Is your family eating right? (Balancing Your Family's Nutrition). A27298.
10. After the kids have gone (Special Nutritional Needs for the Later Years). A27299.
11. Meal Planning:
    - During Pregnancy. 1972 A26182.
    - For the Golden Years (With Pertinent Information on Weight Control and Other Special Diets). 1966 A°1903.
    - For Young Children (New ideas for building little appetites). 1966 A20324.
    - For Diabetics (with fat-controlled and sodium-restricted diet information). 1969 A23275.
    - For Blood Lipid Reduction (with pertinent information on the fat and cholesterol content of food groups). 1965 A19409.

The following diets and loose-leaf guides were also available:

1. Approximate Calorie Values of Common Foods. A25218. D71.
2. Low Calorie "Bonus Diet," The. F8.
3. Approximate Diabetic Bread Exchange Values of General Mills Ready-to-Eat Cereals (without milk, cream, sugar or fruit. C72).
4. Food Sources of Vitamin A and C. C72.
5. Low-Fat, Low-Cholesterol Food Guide. E70.
6. Foods Containing Good Sources of Iron.
7. Planning a Gluten Restricted Diet (wheat-, rye-, oat-free).
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A Manufacturer Looks At Food Safety

By James P. McFarland*

Good afternoon, ladies and gentlemen: I am happy to have this opportunity to address so many people who are clearly among the most important in the food industry. One need think only of the myriad of ways in which food technology has contributed to the welfare of the world to feel deep gratitude toward your profession and those who work in it.

At the same time, I am a bit hesitant in offering my topic, "A Manufacturer Looks at Food Safety," to an audience such as this. You, after all, are the men and women with the knowledge, experience and, I am sure, the dedication and concern to determine in great measure the wholesomeness and safety of the food this Nation eats.

As a manufacturer, nevertheless, I can start by emphasizing that I want the food of this nation to be safe. I am sure that wish is shared by every other responsible food manufacturer in America today. There is good reason this is so

First, food manufacturers are members of society. They eat food. Their families eat food. Like all of us, they have a great personal stake in anything that goes on their tables. As responsible members of their communities, they also recognize their obligation to make sure that products reach consumers in the best of condition with no question of their fitness or quality. It would seem strange indeed to give personal and corporate time to solving economic and social problems of the nation, as many food manufacturers do, and then distribute the basic products of their businesses in an unsafe form.

Second, food manufacturers are businessmen. They depend upon repeat sales, selling their products over and over again to the same people. Doubt about the safety of their products would rapidly become a one-way ticket to failure. As a number of manufacturers have commented over the year, "Customers are hard to come by. We can't afford to poison them."

Advancing costs have spotlighted this phase of a manufacturer's self interest today even more than in the past. The average cost of introducing a new product on the national market is in the neighborhood of $1 million. On the average, only one new product out of nine in the food industry succeeds in capturing a profitable and lasting share of the consumer market. This means a total investment of $9 million or so—to use arbitrary figures—for each successful introduction. If, after becoming established, a new product is found to be unsafe for any reason, the immediate monetary loss is staggering, not to mention the cost of a damaged reputation.

Finally, with the rare exceptions found in any area of human life, food manufacturers seek to be law-abiding citizens. For self-protection and the protection of their businesses, they must insist that their food products meet legal requirements and must go well beyond.

I am sure I don't need to tell you that the safety of the nation's food supply has been outstandingly good in a society of growing complexity. We feed—and feed better than any other nation in the world—a population that has expanded to more than 209 million people, with very, very few problems identified as of food origin.

*Mr. McFarland is chairman and chief executive officer of General Mills, Inc.

Nothing, of course, is perfect in this imperfect world. This means we can never relax our efforts to provide a largely urbanized America with food that is increasingly safe, nutritious, appetizing, convenient to prepare and reasonable in price. Such contributions to public health as the enrichment of flour and bread and, more recently, the vitamin and mineral enrichment of other foods must be a starting place rather than a conclusion. We must harness advancing technology to increase the flow of food to a growing population in an increasingly complex society, guard against the loss of nutrients in production, storage and transportation and do all of this without sacrifice of safety.

Obviously, you, as food technologists, have a gargantuan task that is growing greater. As I was thinking about my remarks today, for example, it occurred to me that food safety though always important, was much simpler in years past than it is today—mainly because we then knew less. Not long ago as history is measured, quality control consisted largely of establishing standards for raw materials, strict enforcement of hygiene and sanitation in the processing plant and assurance of protective packaging to carry finished products from plant to consumer with minimum loss of flavor, nutrition, wholesomeness and aesthetic appeal. Inspections were largely visual or mechanical, consisting pretty much of seeking out foreign objects in raw or semi-finished materials.

Now, refined analytical tools and techniques make it possible to isolate and identify components in food to as little as one part in a billion. Such technical triumphs make all of us as modern food manufacturers, even more dependent than in the past on technologists such as those in this room. More than ever before, we must be partners—along with farmers, ranchers, wholesalers, retailers and others, in keeping America the best fed nation in the world—and each new generation better fed than any that have gone before.

Wise, careful use of chemicals has made and is making our food more nutritious, more appealing, economical and easier to use. It has also facilitated the mass processing and bountiful production that have contributed to so much of our nation's standard of living. Developing chemicals which do the job with safety and rejecting chemicals which present risks is an important current challenge to you as food technologists. Here, you, with those of us responsible as manufacturers, must continually weigh what has come to be called the "benefit-risk" ratio. As I have indicated, some chemical additives have been—and others may be—found to create risk, previously unsuspected. Yet it is clearly necessary in our society to keep chemical additives working for us in bringing nutritious and satisfying food to the American people. Again, this puts an awesome responsibility in the hands of the technologist.

Personally, I believe there are three basic rules concerning food additives that should be observed without deviation.

First, no chemical additive should be used in any product for human consumption that is not safe within the closest limits modern and advancing food technology can establish.

Second, no additive should be used that is not necessary.

Third, the human race must be fed. This third rule implies that we go ahead with the knowledge we have at any given date if the known benefits sufficiently over-shadow the known risks. There is, as I indicated, always the benefit-risk ratio.

Let's go back a moment to the first rule: Only safe additives should be used. As you are all aware, this is easier to talk about than to accomplish. Who knows what additives on the GRAS list today may be rudely removed tomorrow? Wise and conscientious food manufacturers spend millions of dollars each year on research concerning the wholesomeness of their products. That, however, is a drop in the bucket with regard to the need. If each manufacturer attempted to test exhaustively every ingredient he uses in his products, the technical effort would be prohibitive because of the duplication.

The field of food safety, then, is an area in which government, universities, private research organizations and food manufacturers can and must work together, combining their resources to make an otherwise impossible job possible. This is not a new idea, but it is becoming a more practiced idea. General Mills, for instance, is now one of a group of food manufacturers who are cooperating with the Food and Drug Administration in a pilot study of food additives now on the GRAS list. In addition, our company has joined other leading food manufacturers in sponsoring in-depth studies on sulfites, nitrates, phosphates and antioxidants, now being conducted by the Food Research Institute of the University of Wisconsin. These additives, as you know, have already gone through extensive safety analysis and have been used in foods for many years. If, however, new information

shows any legitimate objections to their use, General Mills will take appropriate action, as I am sure, will others,

Another example of the cooperative idea in action is the newly established National Institute for Toxilogical Studies, one function of which will be to afford leadership in expanding knowledge of food additives and to draw essential information from all fields. This is an expansion of government activities which, I believe, we food manufacturers should support and applaud. It promises valuable, needed help in this all-important field.

Ultimately, of course, each individual company still must rely on its staff of technologists to tell it what *not* to do as well as *what* to do in using chemical additives. "Nay-sayers" are as important as "Yea-sayers," sometimes more so. Organization, or structure, is important in achieving the objectivity that corporate technologists need, and you may be interested in General Mills' organization for quality control which, we believe, is somewhat unusual in industry and is highly beneficial to our long-range efforts to serve our customers.

First, at the top of our pyramid, we have a vice president for Quality Control, Nutritional Policy and Food Safety; reporting directly to him is a director of Product Safety, specifically charged to assure the safety and healthfulness of all General Mills food products and the effectiveness of quality control systems for product safety.

Equally basic is our reporting setup from the field. Traditionally, plant quality control technologists report to the plant manager, who reports to the division manager. Only in exceptional cases do issues raised by the plant quality control specialist reach the highest management levels. There is often just too much human temptation for plant and division managers to make decisions that favor increased productivity and lower cost, the factors upon which their personal efficiency is likely to be judged. In General Mills' present system, the quality control technologist at the plant level reports to a quality control manager at the division level, who reports to the vice president I mentioned previously. This vice president, in turn, reports to the president of the company. Although closely coordinated with operations, this line of responsibility is distinctly separate from them.

Even beyond the president now stands a recently formed Public Responsibility Committee of our board of directors, which concerns itself with all matters affecting our responsibility to our customers, the communities in which we operate and the nation. What is exceptional about this system is its ability to keep matters of quality, nutrition and safety in the hands of professionals from plant to president, without interference from production or sales people along the way. We believe this puts emphasis where it belongs. The quality and safety of what we make and sell is even more important than manufacturing economies or sales volume.

As we move into the future, there are some specific additional needs, particularly related to nutrition, with which the manufacturer, in my opinion, needs special help from food technologists. First, industry needs to develop sophisticated quality control monitoring and control systems to prevent excessive overages of vitamins and minerals when fortifying products to meet nutrient labeling declarations. Too much of a good thing can be dangerous.

Second, industry leadership, with the support of technologists, is needed to prevent a nutritional horsepower race between manufacturers, especially in the use of nutrients with any potential toxicity.

Third, food manufacturers need to be careful that their products don't reinforce, or contribute to, food fadism. Balanced, nutritive and healthful diets must be kept as the focus for healthful eating.

Fourth, the food industry should be constantly alert to possible "sins of omission" as well as "sins of commission" on their part. Nutritional weaknesses or safety hazards in a product, in the light of its intended use, should be continually searched out and corrected through product reformulation. Certainly, labeling and advertising should not claim for a product ingredients that it does not have nor benefits which it cannot confer.

Fifth, the food industry and consumers would both benefit greatly from a method of indicating protein quality not dependent upon lengthy, expensive animal tests which are virtually impossible to use in quality control. This is an area in which members of IFT, as scientists, might be able to make a great contribution.

Finally, as a manufacturer viewing food safety, I should like to call upon you as food technologists to play a leading role in public education—in giving perspective to the real problems and the false alarms relating to the food our nation eats.

Much of the concern expressed concerning chemical additives in foods, as well as about herbicides, pesticides, hormones and other chemicals used to boost agricultural production, has been helpful. The more interest the American public has in what it gets for what it pays not only protects the individual consumer but provides a market in which superior performers are more clearly recognized.

In contrast, the pitiless publicity in the mass media which often accompanies any congressional investigation, FDA or USDA ruling can create misimpressions in the minds of the technically untrained laymen that, *at least*, cause unpleasant and unnecessary concern and that at most can cripple the process of meeting the nation's needs for food.

In addition, there are always those self-seeking scaremongers who profit from blowing up scraps of fact into avalanches of fear and consternation. Whenever new knowledge becomes available, it should, of course, be used, but it should not be presented to the public in ways that stimulate fear or panic, as it often seems to be.

The feeding of 209 million people in this country, plus countless millions overseas, is too big and too vital a task to be handicapped except where careful scientific judgment shows clear necessity. People should also know exactly what the indiscriminate banning of chemicals from food and in agricultural production would cost them—in both dollars and satisfaction. It has been estimated that just one effect of such drastic action would be an immediate drop in American farm and ranch production of 30 to 40 percent and complete loss of the year-around availability of many of the convenience foods which have become a part of our nation's life. Rectifying any shortcomings there may be in our present food production and conservation systems is a job for surgeon's scalpel, not the butcher's axe. The public should know this, and food technologists, because of your basic knowledge and your day-to-day contact with advancing science, are in key positions to contribute importantly to the educational process.

I wish that I could give you a blueprint for exercising leadership in this field. I can only urge you to write and speak forcefully at every opportunity, to correct errors as you observe them and possibly, through the Institute of Food Technologists, to launch a vigorous, formal educational program. In this latter connection, there may be opportunity for work with other organizations. I understand that the American Institute of Nutrition is seeking to organize the American Society of Clinical Nutrition, the American Dietetic Association and the Institute of Food Technologists in a united effort to deal with nutritional problems as they arise and to help form a national nutrition policy.

If I have accomplished nothing else today, I hope I have underscored the importance that you, as food technologists, have in assuring our people of food that is both safe and ample. In summary, a quotation from a book entitled, "Food and Society," by the English writer, Dr. Magnus Pyke, may be appropriate. "It seems," says Dr. Pyke, "there is no escape from danger. The conscientious food scientist in his search for nutritional excellence is confounded by the diverse facts of human behavior, by custom, tradition, feeling and religion, by the motives other than health which drive men to choose what they like, by the availability of foods from the land and availability—or lack of it—of money. And now, on the other hand, in his endeavors to avoid harm from poisonous substances, the rational man is again faced with problems. The first is that he does not possess sufficient knowledge of the composition of the foods he eats. The second problem is what the Americans are calling the "benefit-risk ratio." Among the benefits are the contribution of pesticides toward the production of a food supply of superior quality and sufficient quantity, the protection and preservation not only of food supplies but of the fiber, wood, textiles, the control of disease vectors, and the improvement of residential and recreational environments. The progress of science can be defined as the continous minimization of doubt. The enlightened food scientist must, therefore, appreciate the opposing influences which he has to try to understand as he endeavors to make wise decisions."

As a food manufacturer looks at food safety, he sees great challenges but also great promises of a better, healthier, happier world through improved nutrition and improved food safety for all. For leadership in this quest, ladies and gentlemen, we must look first and foremost to you.

ITEM 2—SUBMITTED BY OTHAN WITNESSES

FROM SENATOR SCHWEIKER [1]

[Medical World News, February 12, 1971]

SUGAR: DANGEROUS TO THE HEART?

FROM THIS BARBADOS STORAGE SHED AND COUNTLESS OTHER SOURCES, THOUSANDS OF TONS OF SUGAR POUR DAILY INTO THE AMERICAN DIET—AND SOME RESEARCH NOW POINTS TO AN INTRIGUING LINK WITH ATHEROSCLEROSIS

Sugar is sweet, sugar is good. It coats our pills, it sweetens our coffee. Everybody likes sugar, perhaps because sweetness is the first taste an infant senses.

But sugar is a relative newcomer to our diet, and some scientists are concerned about its safety. Certainly we do not consume 2 lb per person per week of any other dietary additive. Nor have we been taking that much sucrose for long: Sugar has been important in our diet for less than a hundred years.

Sarkara in Sanskrit, sugar seems to have originated in India or Southeast Asia. Though beloved by the Persians, it remained unknown to the Greeks and to the West for centuries. It was introduced to southern Spain by the Moors and to other parts of Europe by the Crusaders.

For centuries, it was available only from apothecaries, who sold it by the ounce, as caviar is sold today. For the rich man or the court, sugar was a precious luxury for use on great occasions: Even in Elizabethan times, all of England consumed only about 88 tons a year. To the man in the street, sugar was practically unknown. For sweetening he relied on scarce supplies of bee's honey, which is chemically not sucrose, but mostly fructose and glucose. These sugars can be absorbed into the blood without change, whereas table sugar—sucrose—must first be digested into glucose and fructose.

In this country, sugar helped start the Revolution when colonists objected to taxes on it and the tea it sweetened. After the Revolution, sugar played a profitable part in the triangular trade whereby New Englanders bought slaves in Africa and sold them in the Caribbean to work the sugar plantations, bought molasses (a byproduct of sugar refining) there and took it back to New England where it was distilled into rum, which was then shipped to Africa to buy slaves.

Widespread cultivation of sugarcane in Latin America, the discovery of processes for refining sucrose from beets in 19th-century Europe, and improved transportation all made it possible for Western man to cultivate his sweet tooth, and few but dentists and dieters have objected.

Dr. John Yudkin does. He thinks sugar is an important cause of heart disease. And a surprising number of people think he has a point.

Dr. Yudkin, both M.D. and Ph.D., is professor of nutrition and dietetics at Queen Elizabeth College of the University of London. From his quiet campus on Campden Hill in Kensington, the biochemist-physician has raised a storm by stressing that deaths from coronary heart disease, which have gone up dramatically in the past 50 years, are more closely related to increasing sugar consumption than to any other dietary change. From the 4 lb a year he ate in 1750, the statistical Englishman increased his consumption to about 25 lb in the 1850s. Today it's about 120 lb a year, or 2.3 lb a week.

Individual sugar intake can range from as little as 20 gm a day to as much as 400 gm, or nearly a pound. The average in Dr. Yudkin's studies is about 140 gm a day, or 980 gm (just over 2 lb) a week, but his method of recording intake tends to underestimate by about 15%.

[1] See p. 509.

"There is an enormous variation in sugar intake with class, with sex, and with age," Dr. Yudkin points out. "For a given age, men eat more sugar than women. We find the sugar intake is maximal at the age of about 18 or 20, and then it goes slowly down throughout life. The curve for men is higher than that for women all the way. And nowadays the poorer tend to eat slightly more sugar than the well-off people, who are paying more attention to their figures."

In the U.S. as in other rich Western countries, there has been an increase similar to that seen in England: Consumption of refined sugar here has doubled in the past 70 years and is now at least 99 lb per person per year (compared with 127 lb in Ireland, 120 in Holland, 115 in Australia, 110 in Denmark, 107 in New Zealand, and 99 in Canada), or about 1 9 lb per week. About half of this amount is taken as visible table sugar—in tea and coffee, sprinkled on cereal or fruit, or used in cooking. The remainder is in pies, cakes, pastries, cookies, candy bars, chocolates, hard candies, jams, jellies, ice cream, gelatin desserts, soft drinks, and the like.

However, the figure may well be higher than 99 lbs., because many methods of recording dietary intake tend to underestimate. The Department of Agriculture, which compiled a comprehensive study of typical American diets among all classes, ages, and areas in 1965 by questioning housewives about their families' eating habits, says sugar consumption may be underestimated since the housewives may omit, or not know about, the snacks consumed by their husbands and children while away from home. Soft drinks, for example, contain 10% to 12% sugar. Furthermore, some food manufacturers now add sugar to food products such as soups, vegetable juices, and salad dressings, which are not considered when total sugar consumption is estimated.

According to three researchers at the State University of Iowa—Drs. Mohamed A Antar, Margaret A. Ohlson, and Robert E. Hodges—average American sugar consumption may be as high as 200 gm per person per day, or an almost incredible 170 lb per year.

But, even in these quantities, is there any reason to believe sugar may be harmful, apart from its contributions to tooth decay and obesity? Epidemiological and historical studies by Dr. Yudkin and other researchers have indicated a close relationship to increasing rates of myocardial infarction. Dr. Yudkin's hypothesis, and that of most other researchers in this area, is that high sugar consumption leads to atherosclerosis, perhaps through an impairment of glucose-tolerance. Diagnosing atherosclerosis during life being a fairly uncertain business, studies are made of mortality from atherosclerosis heart disease and sometimes of morbidity as indicated by angina pectoris and peripheral arterial disease.

Rates of myocardial infarction have increased greatly in the rich countries of the West in the past 40 or 50 years, and this increase correlates more closely to the increase in sugar consumption than to the increase in fat consumption, according to Dr. Yudkin. Some researchers dispute him on this point, saying that the relationship to saturated-fat intake is slightly better, but that the best dietary correlation is to intake of saturated fats *and* sugars. (When nondietary factors are tallied, the best correlation of all is to radio and TV sets, and the next best is to automobile registrations. As Dr. Yudkin points out, this is not as statistically crazy as it sounds, since ownership of radio and TV sets and cars is a measure of physical inactivity.)

As a country grows richer, the average diet increases in total calories and also in the amount of fats and sugars it contains. Compared with the poorest countries, the diets of the richest ones are 50% higher in calories. Fat intake is four or five times higher in the rich countries, but there is not so great a difference in carbohydrate intake. However, there is a considerable difference in sugar intake. Rich nations eat less of the complex carbohydrates from bread, cereals, potatoes, and starch, and more of the simple carbohydrates from sugar. Sugar intake, gram for gram, is almost identical with fat intake, according to Dr. Yudkin's figures.

In the U.S. the average diet is 40% to 50% fat, about 40% carbohydrate, and 10% to 15% protein. In the diet-heart study of Framingham, Mass., (MWN, Sept. 11, '70), where fat intake is lower than the U.S. average, about 40% of the calories came from fat, and about 70% of the fat was of animal origin. According to Dr. Yudkin, consumption of fat in the U.S. has increased by about 12.5% since 1900, and the proportion of saturated fat has actually gone down slightly. In the same period, sugar consumption has doubled. And, of course, there has been a very great increase in deaths from myocardial infarction.

Elsewhere in the world, researchers have studied populations experiencing great changes in their diets, hoping to find some dietary factors to explain increasing rates of heart disease. Dr. A. M. Cohen and his colleagues at the Rothschild Hadassah University Hospital in Jerusalem looked at Yemenite immigrants, who

had a significantly greater incidence of diabetes, hypertension, and raised plasma cholesterol and beta-lipoproteins after they had lived in Israel for 25 years or more than did recently arrived Yemenites.

To Dr. Cohen, this presented an opportunity to compare the effects of the diet of the Yemenite Jews as eaten in Yemen and in Israel. First he questioned several hundred Yemenites about their food habits when they lived in Yemen, and found "two striking differences . . . mentioned by all of them. First, the main source of fat in Yemen had been mutton fat, beef fat, and *Samne* (butter preserved by evaporation of its water content). Second, the quantity of sugar used in Yemen had been negligible."

Working with a Yemenite-born, Israeli-trained dietitian, he studied in detail 20 Yemenite families in Israel less than ten years. The housewives were questioned on the family eating habits and the amounts served. These recollections were checked by measuring the capacity of the kitchen pots brought from Yemen, so that accurate estimates of servings could be made. Finally, all the food information was checked with the husband, who in Yemen had done all the food shopping.

Another group of 20 Yemenite families who had lived in Israel for more than 25 years was studied, with the dietitian visiting daily for a week, measuring quantities served, checking daily menus, and noting the amounts in provisions and cooked dishes in the kitchen. Among the points noted were the amounts of animal fats, of margarine, of oil (which in Israel meant the mono or poly-unsaturated soya, sesame, and olive oils), of total carbohydrates, of sucrose, and of mono- and disaccharides from fruit, vegetables, milk, honey, and sucrose.

Comparing the diets eaten in Yemen and in Israel, Dr. Cohen found a slight increase in calories (and in average body weight) in the 25-year residents and no change in total protein. It was a different story with fats and sugar. "In Yemen, the fats were mainly or solely of animal origin; vegetable oil was rarely used. The amount of fat from animal sources consumed in Yemen was similar to the amount of animal fat plus margarine consumed by old settled Yemenites in Israel. In Israel, there is a small increase in oil consumption and consequently in total fat," but the oil was, of course, vegetable oil, and the fat changes did not, in Dr. Cohen's view, explain why ischemic heart disease and diabetes are relatively rare in new Yemenite immigrants. The diet in Yemen was neither a starvation nor a semi-starvation one and could not account for the low cholesterol and low beta-lipoprotein levels in the newcomer group.

That left sucrose. While they had eaten almost no sugar in Yemen, "in Israel there is a striking increase in sugar consumption, although little in total carbohydrate." In Israel, about 20% of the Yemenites' carbohydrates were consumed as sugar, compared with nearly zero in Yemen. Noting that sucrose was thought to cause increases in plasma cholesterol and beta-lipoproteins in animals, Dr. Cohen has begun animal work of his own to see the effects of a high-sucrose diet.

Other researchers have investigated populations with high fat intake and low sugar intake, such as the Masai and Samburu of East Africa, and found a low rate of coronary disease; some workers in the field who prefer the saturated fat—cholesterol theory attribute the low incidence to the protective effect of physical activity. But the population of St. Helena has a fairly low fat intake, a high sugar intake, and is physically active, but has a high rate of heart disease.

The epidemiological and statistical studies may indeed point the way, as they have done in the areas of smoking and cancer, and oral contraceptives and thrombosis, but clinical studies would make the point more strongly. At the moment, this is an area of hot international dispute and conflicting opinions. Several years ago Dr. Yudkin and an associate, dietitian Janet Roddy, began investigating the diets of patients with recent proved myocardial infarction. Had they been eating more sugar than controls? How much more? For how long?

They compared the diets of patients who had suffered a first myocardial infarction in the past three weeks and who said they had not changed their diets in the previous five years with patients suffering from peripheral arterial disease (an indicator of atherosclerosis) and with normals. They found that the two groups with arterial disease had double the sugar intake of the controls, and Dr. Yudkin expressed himself as predicting that persons taking more than 110 gm of sugar a day were five times as likely to develop a myocardial infarction as those taking less than 60 gm.

A considerable flap ensued, centering on the validity of the dietary questionnaire method, the idea that sugar was treated by the body in the same way as any other carbohydrate, and the fact that some other workers did not find patients with myocardial infarction to have a significantly higher sugar intake. Follow-up

studies by Dr. Yudkin and Mrs. Roddy showed that the questionnaire method was as reliable as the food-dairy method, and other investigators confirmed this. They also found that people's sugar intake was usually regular: People tend to take the same number of spoons of sugar in their coffee or tea, for example, and are similarly regular in the amount of soft drinks, pastries, and candy that they consume. Sugar intake is also easier to measure, and can be measured more accurately, than that of most other foods.

The difficulty in substantiating higher sugar intakes in myocardial infarction patients in other studies often turned on a time factor. Dr. Yudkin and Mrs. Roddy had interviewed their patients within three weeks of the first infarct; other workers often interviewed patients later. Doctors frequently advise such patients to lose weight, and sugar is usually one of the first things to go.

Dr. Yudkin emphasizes that he does not believe high sugar consumption is the only cause of heart disease, which, he told MWN, is probably multifactorial, involving such risk factors as diabetes, peripheral vascular disease, smoking, hypertension, and physical inactivity.

Dr. Yudkin's work generated considerable public as well as scientific interest in Britain, and the Medical Research Council set up a working party of distinguished physicians and epidemiologists to investigate a possible link. Meanwhile, in Scandinavia, the medical boards of Finland and Sweden looked into the whole question of diet and in 1968 recommended that the entire population reduce its consumption of sugar and products containing sugar as well as its consumption of saturated fat and cholesterol, and increase its consumption of unsaturated fats.

But if sugar does play a causative role in atherosclerosis and coronary heart disease, how does it work?

Dr. Yudkin suggests there might be a pathway through the pancreas: the glucose load leading to excess circulating insulin and this in turn affecting lipid metabolism, a situation resembling a sort of prediabetes. Certainly, researchers have known since the 1920s that diabetics suffer from coronary heart disease and vascular disorders far more often than normals do, and that these disorders occur at younger ages. And patients with atherosclerotic heart disease often show impaired glucose tolerance.

In the massive epidemiological study of Tecumseh, Mich., Dr. Frederick H. Epstein found an association between an elevated blood sugar level and coronary heart disease. Although he says he does not agree with Dr. Yudkin's work, Dr. Epstein, who is professor of epidemiology and director of the Cardiovascular Research Center at the University of Michigan in Ann Arbor, has said that there is some evidence, rather controversial in his opinion, that refined carbohydrates raise serum triglycerides more than complex carbohydrates. "But this is not the same thing as saying that a high sucrose intake reduces glucose tolerance, producing hyperglycemia," he said.

"I do think that hyperglycemia is an important risk factor in coronary heart disease in people with a specific genetic predisposition toward prediabetes, in the same way that people with hypercholesterolemia are, it would seem, more sensitive to saturated fats," he said, adding that he agreed with Drs. Robert B. McGandy and Frederick Stare of Harvard that saturated fat was the more important risk factor. "My hunch would be that the kind of diet that is high in calories and high in fat would also diminish glucose tolerance in susceptible people," he said.

In Sweden, Dr. Fredrik Wahlberg of the Karolinska Institute investigated intravenous glucose tolerance in patients with myocardial infarction, angina pectoris, and intermittent claudication. Ischemic heart disease was associated with a high frequency of elevated serum lipid levels and clinical diabetes, and Dr. Wahlberg suggested that perhaps "abnormal carbohydrate metabolism, as revealed by a low intravenous glucose tolerance test only, could be related to ischemic heart disease as well as to clinical diabetes." Testing his patients with ischemic heart disease, he found that half or more had abnormal glucose tolerance and about half also had raised serum cholesterol levels. Abnormal glucose tolerance was also associated with a poor prognosis after the first myocardial infarction and was correlated with high serum triglycerides.

TWO POUNDS A WEEK?

MWN's hypotetical sugar maven is a businessman who likes two teaspoons of sugar in his coffee. For breakfast he has two cups of coffee and cereal, on which he sprinkles one teaspoon of sugar. At the mid-morning coffee break his secretary gets him a cup of coffee. He takes another cup with his lunch, and one more at the afternoon coffee break. After dinner he has a final cup for the day.

In one day the sugar maven has consumed approximately 3.5 oz. of sugar, or 24.5 oz. a week, just over a pound and a half.

Both medical and sugar authorities agree that visible sugar makes up about one half of a person's total dietary intake, the rest being in candy, desserts, snacks, and soft drinks. If so, then the sugar maven is taking just over 3 lb. of sugar a week, well above the national average.

With Dr. Lars A. Carlson he then investigated the relationship between serum lipids and abnormal glucose tolerance in patients with myocardial infarction, angina pectoris, and intermittent claudication. Half the men had some plasma lipid abnormality, most often an elevation of serum triglycerides, and more than half had either a borderline or a diabetic intravenous glucose tolerance test. Fewer than 20% had normal serum lipids together with a normal intravenous glucose tolerance. The women showed a similar pattern, but in neither group could the researchers find a relationship between abnormal glucose tolerance and high serum triglycerides.

Another group of Scandinavian workers, led by Dr. I. Christiansen at the Blegdamshospital and the Rigshospital in Copenhagen, found that patients with ischemic heart disease but without clinical diabetes formed two groups. In those with impaired glucose tolerance there was [illegible]naved, less marked rise in serum insulin in response to the glucose load and a relatively high concentration of free fatty acids following glucose loading. "These features," they reported, "correspond closely to those seen in patients with maturity-onset diabetes."

In the other group of patients, those with a normal glucose tolerance, Dr. Christiansen found abnormally high concentrations of serum insulin in the fasting state and following injection of glucose. Such patients, he suggested, could maintain a normal glucose tolerance only by raising the serum insulin concentration, a state often seen in older people. Like the Stockholm researchers, they found no correlation between the concentrations of serum cholesterol and serum triglycerides. Dr. Epstein, in Michigan, has suggested that high levels of serum cholesterol and of the triglycerides "are both predictive, but among different groups of people—one type that represents the various degrees of hypercholesterolemia, the other type related to carbohydrate-sensitive hyperglyceridemia."

As to the role of sugar in raising the triglyceride level, Dr. Epstein said, "I think there's no question that in the so-called Type IV hyperlipoproteinemia, a high carbohydrate intake, whether it's from refined or complex sources, will raise triglyceride. They have trouble metabolizing carbohydrate, whatever it is. Given a choice, I'd rather have my carbohydrate in a complex form than a refined form. There's no proof that high triglycerides predispose to coronary heart disease in the same way high cholesterol does, but in Type IV, serum cholesterol also goes up, but not to the same degree."

If some types of hyperlipidemia are carbohydrate-induced, might there be, as Dr. Yudkin suggests, an important difference between the way sugar and starch are metabolized? A team of Scottish researchers investigated the effect of sucrose restriction on serum lipid levels in survivors of myocardial infarctions and found a consistent, significant fall in serum triglycerides and small decreases in serum cholesterol levels. When the diets were stopped, the levels rose almost to the pretreatment state.

Two American investigators, Drs. Peter Kuo and David R. Bassett at the Hospital of the University of Pennsylvania, found that in patients with normal glucose tolerance, "sugar is a potent hpemic agent as compared with starches, and a high dietary sugar intake may well be the most important factor in the production of the commonly clinically encountered type of hyperglyceridemia." They pointed out that sugar and starch seem to evoke quite different lipogenic responses, and that a high sugar intake "can disturb the balance between the synthesis of triglyceride, cholesterol, and other lipids and the uptake and utilization of them by the tissues, resulting in hyperglyceridemia even in normolipemic patients and healthy volunteers."

Dr. Kuo, who is director of the lipid research laboratory and also associate professor of medicine, told us he thought the primary mechanism causing the hypertriglyceridemia was active endogenous lipogenesis. "All of us, whether or not we have a tendency to produce high blood lipids, if we were to ingest a lot of carbohydrates, of which sugar is a particularly concentrated form, would get high blood lipids, especially triglycerides, although we wouldn't have as marked a response as a person who has a tendency to high blood fat readings." Also, Dr. Kuo says, in normal subjects, the carbohydrate-induced hypertriglyceridemia tends to go down with time, as if the body were adjusting to the new levels of intake.

A very high intake of complex carbohydrates would raise blood lipid levels in the same way as sugar, Dr. Kuo said, but a person is unlikely to eat the amounts required. "If we take a chocolate bar, for example, we are eating the equivalent of five or six slices of bread." In the average American diet there is likely to be more sugar than complex carbohydrate, and "no doubt many of us are getting excessive amounts of carbohydrates, amounts exceeding what we could normally metabolize."

"We are very short-sighted when we feel that any fat elevation in the blood must, of course, be from fat in the diet. Much of the fatty material in our bodies, or in any animal species, is made by the body itself, and the raw material the body uses to make it is invariably not the fat substances but the excessive sugars and starches."

Butterfat and other saturated fats, he points out, may add to the problem because they contain short-chain and long-chain fatty acids, which the body uses as it does sugars, and it is almost impossible to remove all these fats from the diet or to make a palatable meal without them. "No matter how we trim a piece of meat, there's fat marbled all through, and as much as 60% of the weight is in the form of fat. Fortunately, most of us take care of that kind of fat very well."

But when the diner adds a dessert that's the equivalent of half a loaf of bread? "Anybody who is overloaded with carbohydrates for a long time eventually would develop a disturbance of carbohydrate metabolism of some degree," Dr. Kuo says, "and as a result would be suffering from the consequences of the so-called diabetic state." Since 1965, working with humans, he and his team have demonstrated that a high intake of carbohydrates increases the pre-beta-lipoprotein particles that incorporate and carry the various blood lipids in the body.

Meanwhile, back in London, Dr. Yudkin had been working with rats and then human volunteers and finding other differences. In animals receiving a high-sucrose diet, he found an impairment of the insulin system that seemed to be due to the rapid fluctuations on blood sugar. With human volunteers fed "atherogenic" diets high in cholesterol and also in either starch or in sucrose, he found that both starch and sucrose groups had high serum cholesterol levels, but that the group on the high cholesterol high sucrose diet had increases in serum triglycerides too, and a decrease in the week following the removal of sucrose from the diet.

About one third of his volunteers seemed to be particularly sensitive to a high-sucrose diet, responding with greatly increased levels of triglycerides and serum immunoreactive insulin (especially during a glucose tolerance test), and also with a weight gain and a significant increase in platelet adhesiveness. This led Dr. Yudkin to suspect that some people may be much more sensitive to high sugar intake than others.

He also found that those taking sucrose excreted small amounts—about 500 mg a day—in the urine, contradicting the belief that sucrose is always completely hydrolyzed before absorption and raising the possibility that these small amounts might be related to changes in cell metabolism. Other English workers, in animal experiments, found that rats fed sucrose or fructose had more body fat than rats fed glucose, gained more weight, and had a higher lipid content in their abdominal fat.

What may happen, many researchers suggest, is that a high sucrose intake continued over many years may lead to an impairment of the insulin response, perhaps a delayed but prolonged response. At the same time, high levels of circulating insulin (also found in obesity, hypertension, coronary heart disease, and overt diabetes) may be damaging to arterial walls and lead to the deposition of atherosclerotic plaques.

That was roughly where matters stood until late December, when the Medical Research Council's distinguished "working party" published its report of the dietary sugar intake of men with myocardial infarctions. Carried on at three centers, one in London and two in Scotland, along lines similar to but not identical with Dr. Yudkin's studies, the investigations revealed that patients with myocardial infarctions consumed only slightly more sugar than controls, and the difference was not statistically significant. They also found that a high sugar intake was related to smoking habits: Nonsmokers and ex-smokers took less sugar in their tea. And the experts concluded that Dr. Yudkin's hypothesis was "extremely slender."

Dr. Yudkin does not agree, not at all. "What I think they were trying to do was simply to demonstrate that Yudkin was wrong in showing a high sucrose intake in people with coronary disease. They have convinced themselves they've done that; they then went a bit further by saying the whole hypothesis is nonsense. I think they were wrong on both scores. I don't believe their results, and even if they were true, I don't think it undermines the hypothesis.

"First, remember that evidence of high sugar intake in people with coronary heart disease is one out of several lines of evidence. Second, let me point out that nobody has ever demonstrated a higher fat intake in individuals with heart disease than in those without, but this hasn't stopped them from believing that fat is a cause of heart disease." The point, Dr. Yudkin told MWN, is that some individuals seem to be more susceptible to a high sucrose intake than others. Also, he felt the study was poorly controlled, with the London group of controls including patients with gastrointestinal disease, cardiovascular disease, gallbladder disease, and intestinal cancer;—all conditions that might have altered the patients' diets.

"Where they did take some care to match the experimental group with the control group, they did in fact find some differences in sugar intake—small, but they found them," he said.

"We believe that some people, but not all, are susceptible to a high-sucrose diet, and we believe that it works hormonally," Dr. Yudkin explained. Right now he has two studies underway on the effects of a high-sucrose diet in normal people, and he told MWN that he is finding "quite considerable" disturbances in hormone levels. "With about a third of our volunteers, we find a high sugar intake leads to a tremendous rise in insulin, and we find a much more striking rise in corticosterone. We think this is likely to be very relevant because both of these hormones are very much concerned with carbohydrate and fat metabolism and one of the features of coronary heart disease that everybody forgets is that it involves a considerable metabolic disturbance, not just cholesterol stuck on the side of the arteries. It's much more common to have an impaired level of glucose tolerance than to have a high cholesterol level."

Not only does a high sucrose intake cause a rise in blood cholesterol and triglycerides and impair glucose tolerance but it also affects the level of 11-hydroxycorticosterone, "This is an even more potent hormone than insulin, and it could be this is number one, not insulin, or at any rate earlier in the pathway, whatever that is. The increase is enormous. At the end of two weeks on a high-sucrose diet, in these people whose insulin goes up a bit, 11-hydroxycorticosterone goes up something like fourfold in fasting blood. I wouldn't want to walk about with a high level of 11-hydroxycorticosterone, and my endocrinological friends are rather alarmed when I tell them it goes up this amount."

As for the correlation the MRC study found between a high sugar intake and smoking, Dr. Yudkin says, "You can toss a penny and decide whether it's smoking that causes heart disease and sugar is accidental, or sugar causes heart disease and smoking is accidental." But he thinks neither is accidental.

While Dr. Yudkin has been investigating hormone levels, Dr. Cohen in Israel has been trying to duplicate in rats the sort of situation he had seen in Yemeni immigrants, where the addition of sucrose to the diet seemed to have the effect of triggering diabetes in individuals who had not been diabetic on a sucrose-free diet and increasing the incidence of ischemic heart disease. Last summer he presented his work, currently in the press, in a seminar conducted at Harvard by Dr. Jean Mayer, professor of nutrition, who is also President Nixon's consultant on nutrition.

According to Dr. Mayer, who called his work "the most telling on the subject," Dr. Cohen selected rats with decreased glucose tolerance and bred them so that he had a large group of animals that were not diabetic but that did not handle sucrose as efficiently as normal rats. "Then," Dr. Mayer told MWN, "he can precipitate changes in their kidneys and retinas by feeding them a high-sucrose diet, changes not unlike those seen in diabetes. The evidence Dr. Cohen has on the interaction between carbohydrate metabolism and sucrose seems to me probably the intermediary through which sucrose may well intervene in atherosclerosis."

Dr. Mayer says he thinks nutritionists have tended too much to look for universal dietary factors. "We don't know a great deal about the interaction between dietary and constitutional factors. My own work has shown that there is a very, very strong hereditary factor in obesity. I think that similar constitutional traits are probably very important here in determining susceptibility to atherosclerosis, as they are to diabetes." There is also the question of interaction between physical activity, high fat intake, and high sugar intake, Dr. Mayer feels.

Although there is "a lot of suggestive evidence" that large doses of sugar are instrumental in triggering disturbances in carbohydrate metabolism that may lead to hypercholesterolemia in susceptible individuals, Dr. Mayer stresses that "this does not by any means invalidate the fact that saturated fat and fatty acids are terribly important. From a practical viewpoint, I would certainly subscribe to everything that's been said on cutting down saturated fat and having more polyunsaturated fat, but I would also cut down sucrose."

FROM THE CENTER FOR SCIENCE IN THE PUBLIC INTEREST

WASHINGTON, D.C., *March 15, 1973.*

Senator GEORGE MCGOVERN,
Senate Select Committee on Nutrition and Human Needs,
Washington, D.C.

DEAR SENATOR MCGOVERN: The Center for Science in the Public Interest is a tax exempt, nonprofit organization staffed by scientists who investigate and seek to solve consumer and environmental problems. Our Food Project is concerned with foods and nutrition, the food industry, and governmental regulatory agencies. Last September[1] I testified before your committee on unnecessary uses of food additives.

I have followed with interest your current inquiry into the nutritional quality of breakfast foods. I share the opinions of several witnesses who deplored the high sugar content of some widely advertised and sold products.

The breakfast food companies have been before other congressional committees in recent years and are groping for ways to counter the enormous publicity that congressional hearings have brought to detrimental effects of popular and profitable products. Several manufacturers, including General Mills, General Foods, and Quaker, have issued "nutritional policy statements," which enunciate these firms' stands regarding the nutritional value of their products. Robert White and I have read these documents and then went to the supermarket in order to compare the philosophies espoused in the policy statements (and in a couple of speeches by food industry executives) to the actual operating policies of the companies. Our analysis of the situation is described in the enclosed paper, "The Nutritional Policies of Major Foodmakers." Our general conclusion was that the actual nutritional policy of the foodmakers is "all our products will be nutritions, except for those that aren't."

I believe that our paper and the documents issued by the foodmakers would be of interest to observers of the food industry and would be grateful if you included them in the hearing record.

Sincerely yours,

MICHAEL JACOBSON, *Codirector.*

[Enclosures]

THE FOOD PROJECT

THE NUTRITION POLICIES OF MAJOR FOODMAKERS

By Michael Jacobson and Robert White

The trend towards processed and fabricated foods increases with every passing day. Food technologists are developing new artificial colors and flavors—and new methods of combining them—and the ad agencies are devising more persuasive ways of promoting the new products. That these foods may be injurious to health was of little concern to their manufacturers who practice what economist Milton Friedman preaches: a corporation's concern is profits, not social welfare.

In recent years the press has given wide publicity to the nutritional inadequacy of certain man-made munchies. Some of the food companies, as might be expected, have responded with lofty and sometimes glossy statements proclaiming their great concern about nutrition—while continuing to churn out products that make a mockery of their statements.

In recent months at least four large food companies have issued "nutritional policy statements"—General Foods, General Mills, Pillsbury, and Quaker. These documents are quite brief but they can keep your stomach churning for a week. The goal of the statements is to assure consumers that their nutritional needs are being well taken care of by the major foodmakers.

[1] See U.S. Senate Select Committee on Nutrition and Human Needs, hearing of Sept. 21, 1972, Part 4C—Food Additives, pp. 1519-60 and 1601-63.

Introductions to the statements are quite promising:

> General Foods: "General Foods recognizes its responsibility for the nutrient content of the food it produces."
>
> Quaker: "Quaker's nutrition policy is designed to insure that as a company, we will continue to contribute to sound nutrition for all persons."

General Mills and Pillsbury express similar ideals in their nutrition policies. In essence, the companies are saying, "you do the eating, and leave the nutrition to us." Trusting the people who make our food is easily done, but beware the needs of your body. Cool Whip, soda pop, Jello, candy bars, plus a host of other products may satiate your hunger but ignore the rest of you.

The food companies admit that they market some nutritional nonentities. Their policy statements attempt to justify the existence of junk foods in the following manner:

> General Foods will "define a scientifically sound nutrient specification for each of its products, except where the product's contribution is known to be primarily social or pleasurable."
>
> General Mills says, "Our products will be designed to alleviate hunger, and/or to meet specific nutritional needs or to give pleasure to the eater."
>
> Quaker: "Not all foods should be expected to be primarily nutritious. Fun foods, supplementary items to other foods, etc., will have no imperative nutritional fortification and will carry no nutritional claims."

In other words, "All our foods are nutritious, except for those that aren't." Despite their highfalutin policy statements, Pillsbury will continue to produce its Funny Face beverage, while General Foods competes with Kool-Aid. General Mills will produce its frostings and Quaker its sugary breakfast foods.

It is stated by the producers of junk foods that everyone will intelligently balance his or her diet. This is an attractive theory, but it is more fantasy than fact. The food manufacturers spend millions every year on advertising profitable—not necessarily nutritious—products and are themselves largely responsible for the general public's inability to choose a sensible diet. Many Americans have succumbed to sophisticated saturation advertising techniques and have been gradually shifting from traditional menus to profitable, but less wholesome and nutritious, products.

Food industry executives claim they are aware that Americans may be consuming poorly balanced diets. James P. McFarland, Chairman and Chief Executive Officer of General Mills, said on October 30, 1972, that:

> ". . . food manufacturers need to be careful that their products don't reinforce, or contribute to food faddism. Balanced, nutritive and healthful diets must be kept as the focus for healthful eating."

But Thomas S. Thompson, Senior Vice President of Research and Development at General Foods, suggested an alternative to balanced eating in June 1971:

> "Now more and more we just eat fun foods to the exclusion of more traditional foods—and it follows that these foods must be nutritionally balanced."

Mr. Thompson's half way measure of fortifying fun foods is closely related to a principle expressed in all of the policy statements. General Mills says it this way:

> ". . . we must continually monitor changing food consumption patterns in the United States and do what we can to fill nutritional needs as they become evident."

This is an example of the policy statement's self contradictory nature. Food manufacturers admit that people eat large amounts of "fun foods" and they promise to adjust nutritional standards to meet the country's needs. Yet, they insist they are under no obligation to fortify "fun foods".

Fortification of foods that are low in nutritive value, but highly profitable, is certainly not as desirable as a return to a diet composed of natural, relatively unprocessed foods. Nutritionists don't yet know enough to ensure that all lost

nutrients will be replaced. But the food companies' refusal to honor even their qualified promises to fortify in light of an obvious need is a telling indication of the worth of their nutritional policy statements.

Nutrients are frequently destroyed during processing; restoring the lost vitamins and minerals is often as practical as it is desirable. Restoring nutrients to processed foods is not always to the liking of the foodmakers. Some of the policy statements find ways to excuse their companies from doing so. General Mills, for example, is willing to restore nutrients "when it is possible to do so without falling below acceptable thresholds of taste, stability or appearance." The product is made regardless—it's only that nutrients are left out if they detract from its sensory characteristics.

Are the people from the Big G (General Mills) doing their level best to fulfill even their limited promise to fortify? Betty Crocker (a division of General Mills) markets her brand of dehydrated potatoes along side of Pillsbury, French's, and others. Pillsbury manages to return vitamin C—lost on the journey from skin to box—to all their dehydrated potato products. French's restores the vitamin to one of its potato mixes. Betty Crocker has chosen not to restore any of her potatoes. No wonder that some people say that the Big G stands for the Big Gyp.

The food industry is fond of extremes; no, or too few, nutrients in a horde of products, and artificially superfortifying a chosen few to an unnecessary and possibly harmful extent. Some food manufacturers are vying with each other to see who can pump the most vitamins into a certain type of product. This so called "horsepower race" is most noticeable in breakfast cereals, Quaker's "King Vitamin" and General Mills' "Total" and "Kaboom" contain 100% of the MDA for six vitamins and minerals, yet people like Mr. McFarland of General Mills pontificate about stuffing too many vitamins into foods:

> "Industry leadership, with the support of technologists, is needed to prevent a nutritional horsepower race between manufacturers, especially in the use of nutrients with any potential toxicity."

Evidently Kaboom crunches louder than Mr. McFarland speaks, and the Big G policy statement explains why:

> ". . . selected products may be fortified to higher levels than those suggested by such guidelines (National Research Council and the AMA) if there is a real need or want by consumers for such supplements to their diets."

If there is a "need" it can often be more cheaply met with a vitamin pill or, better yet, a balanced diet. Any desire for such products is usually prompted by advertising, not need.

Even the breakfast cereals that are rationally fortified and are nutritious may not always be wholesome. Kaboom!, Sir Grapefellow, Sugar Crisp, Pink Panther Flakes, Baron Von Redberry, Sugar Frosted Flakes and many others are little more than bits of grain stuck together with gross amounts of sugar. A dollop of artificial coloring, a dash of artificial coloring, plus a little synthetic preservative add that extra touch that "consumers demand."

The average American consumes over 100 pounds of sugar every year, but the food industry maintains that this amount of sugar is compatible with a good diet. Many doctors, dentists, and scientists disagree. All this sweet stuff may discombobulate our systems more than is commonly believed. Encouraging youngsters to have thirty-two sweet teeth can result in a mouthful of cavities and a lifelong battle with obesity. Some researchers believe that sugar is also a causative factor in heart disease and diabetes. Furthermore, sugar—with no nutritionally redeeming qualities—pushes nutrients out of the diet.

Sugar is just one of the additives that detract from the wholesomeness of processed foods. Artificial colors, preservatives and flavors are staples for the chemical chefs in research and development kitchens. Mr. McFarland of General Mills noted in his speech that one of the three basic rules concerning the use of additives is to scrupulously avoid unnecessary ones. In spite of his warning, his company pushes Trix, Sir Grapefellow, Baron Von Redberry, Frankenberry, cake mixes, and frosting that are laden with unnecessary colorings, flavorings and preservatives. Other companies with "nutrition policies" produce similar products.

Betty Crocker, smiling benevolently from the side of a Hamburger Helper box, is an appropriate symbol for all the giant food manufacturers. She invites us into the realm of fabricated foods as if we are all her most cherished children. But old Aunt Betty—nutrition policy statement or not—is all business, and we would do well to remember that.

Except as a public relations gimmick, it is essentially a waste of time for companies to produce nice, glossy "nutrition policy statements." The statements are compendia of generalities that excuse any food a company wishes to produce. Food companies are motivated by profits, and they will sell anything that makes them a profit. If the product is nutritious, that's nice: but if it is non-nutritious or positively injurious, there are few compunctions in selling it. Nutrition policy statements do not necessarily make foods nutritious.

General Mills Nutrition Policy Statement

I. BACKGROUND

General Mills divisions and subsidiaries manufacture and distribute a wide variety of food products. These products are consumed in turn by a wide variety of people to alleviate hunger, to fill nutritional needs and/or simply because they taste good. We feel a social obligation to provide foods which meet these needs, and to do so as effectively as possible. We think that as part of this process, we must continually monitor changing food consumption patterns in the United States and do what we can to fill nutritional needs as they become evident. And further, we believe that we have a continuing obligation to provide sound nutritional information as part of the process of efficient manufacture and distribution of good foods.

II. POLICY

1. Our food products will be safe, wholesome and aesthetically appealing. They will be produced in conformity with the spirit as well as the letter of applicable food laws and regulations.

2. Our food products will be designed to alleviate hunger, and/or to meet specific nutritional needs, or to give pleasure to the eater.

3. A food clearly designed as a replacement for an existing food or meal will be so formulated that its contribution of significant nutrients will be at least as much as that of the food replaced, if this can be done without falling below acceptable thresholds of taste, stability or appearance.

4. Again, when it is possible to do so without falling below acceptable thresholds of taste, stability or appearance, we will restore any loss of significant nutritional factors to their preprocessing levels.

5. In designing our food products and in promoting their consumption, we will generally follow nutritional guidelines such as those contained in the joint policy statement of the National Research Council and the American Medical Association. However, selected products may be fortified to higher levels than those suggested by such guidelines if there is a real need or want by consumers for such supplements to their diets.

6. We will convey nutritional information about our products accurately and in good taste, and will work toward bettering nutrition education overall.

Quaker Oats Nutrition Policy Statement

Through the manufacture and distribution of nutritious, high-value grain products, The Quaker Oats Company has contributed to good nutrition and good health since its founding almost 100 years ago. Throughout its history, the Company also has pioneered in enrichment and fortification, meaningful labeling, effective consumer communications and good plant sanitation. Quaker is now, of course, also involved in many types of foods other than those made exclusively from grains.

It is Quaker's policy to continue its leadership role in the very complex modern era of food and nutrition. This new era is the result of advancements in science and food technology which have brought consumers a new freedom to choose foods and menus which meet their expectations for nutrition, convenience, creativity and pleasure—whether they are eating at home or away from home.

As food and eating patterns become more complex and therefore less familiar, assurance of a balanced diet can become more difficult. Quaker's nutrition policy is designed to insure that as a Company, we will continue to contribute to sound nutrition for all persons. The Nutrition Policy as herein outlined is applicable to the United States and Canada, and we are working toward its application in our International operations.

For most people, foods are not medicine, to be taken in measured quantities for a specific purpose. Most people acquire, or fail to acquire, adequate nutrition, because of their personal selections of foods available from an enormous variety. This choice is a basic freedom and a fundamental element in our country's economic progress. (For some people, economic deprivation makes the choice less varied; foods providing major parts of the diet for low-income people deserve special emphasis regarding high nutritional values in the U.S. and abroad. The Company's policy provides for senior personnel to have responsibility for seeing that Quaker serves this segment of the public.)

For the general population, however, sound nutrition policies should be based on four principles:

1. maximum freedom of choice within the context of legal protection for health, safety and honesty;
2. accurate and complete label information for nutrients supplied in significant amounts;
3. product advertising that will communicate nutritional information where possible;
4. an emphasis on improving levels of nutrition understanding.

The Quaker Oats Company's *Nutritional Policy Committee* is responsible for insuring that the Company's nutritional policies, formulated and based on the principles above, are met. In addition, it should be understood that those with management responsibility in the areas of food marketing, advertising, manufacturing, research and product development will be required to conform their practices with this policy.

The Committee is chaired by the Vice-President—Research and Development, and includes the Vice-President—Corporate Affairs, General Managers of the Cereals Division, the Frozen Foods, Mixes and Corn Products Division, the Burry Division and a Law Department attorney.

The Nutrition Policy consists of eight parts. Each is summarized below and the specific details of the first four are spelled out in detail in Appendix A–D.

A. Nutritional Content of Foods.—The Research and Development Division has established eight categories of foods with nutritional standards for each category. All Quaker products must meet the standards of their category. The standards recognize that the public consumes some foods which are not rich in nutrients; therefore, other food categories should be (and are) nutritionally strengthened to allow for so-called "fun foods." The standards describe nutrient levels which must be present in individual product categories. (For complete policy on nutritional content of foods see specific subhead.)

B. Labeling.—A consistent system for nutrient labeling and the most easily understood terminology for complex ingredients will be used. To the extent permitted by the law, the Company will label all products which make a significant nutritional contribution to the diet with ingredient information. A statement that additional nutritional information on Quaker products is available on request, will be made on all products. (For complete policy on labeling see specific subhead.)

C. Advertising and Promotion.—The Company prefers to promote foods on their nutritional merits, and will do so when that approach can be effective in marketing. The advertising and promotion policy prohibits nutritional claims unless the product makes a significant nutritional contribution to the diet. It also prohibits the illusion of nutritional claims by implying excessive physical or psychological benefits or using such words as "supercharged." (For complete policy on advertising and promotion see specific subhead.)

D. Nutrition Education.—The Company's policy commits Quaker to nutrition education programs through a variety of media, including packages and television. It cautions against over-emphasis on the ability of brief television product commercials to convey significant nutrition education although nutrition information in such commercials is strongly encouraged. Many other methods which the Company uses to convey nutrition information are described. (For complete policy on nutrition education see specific subhead.)

E. Food Product Initiation and Review Procedures.—A member of the Nutritional Policy Committee or a delegate must sign and approve all R & D New Human Food Project Product Authorizations in their area of responsibility and Research and Development will review and advise regarding any nutritional opportunities which they feel should be considered.

The Nutritional Policy Committee, through the Food Product Initiation and Review Procedure, will insure that Quaker's overall food product mix will have a significant nutritional purpose.

F. Organization for Special Projects in Nutrition.—Senior personnel in many areas of the Company, of course, have major nutritional responsibilities. Research and Development, Marketing, Consumer Services and Corporate Affairs all have on-going responsibilities for specific programs. Additionally:

1. A senior marketing executive is charged with marketing responsibility for nutritional projects designed for special categories of the population; e.g., low-income ethnic groups, products for sales to governments, etc.

2. The equivalent of at least one full-time staff nutritionist will be involved in contributing to nutritional programs beyond the normal scope of business, e.g., working on hunger and malnutrition problems in the U.S. and internationally, coordinating Quaker research with the most contemporary thinking in food and nutrition in the U.S. and throughout the world.

G. Internal Education Programs.—The Research and Development Division and the Corporate Affairs Department have responsibility for conducting nutrition and consumer education reviews for general managers, marketing managers and support personnel, formally on at least a once-a-year basis and informally at all times.

H. Industry, Government and Consumers—The Company encourages close cooperation and frequent communications between industry, government and consumers. We consider "consumerism," in fact, to have been our business long before the word was coined and applied in a different context. We support the development of a sound national nutritional policy, and where studies such as the current one by the National Academy of Sciences for the Food and Drug Administration indicate that our own policies should be modified, we will act accordingly. We also will support and initiate legislative and regulatory action that meets the legitimate needs of consumers, with a particular concern for those at low-income levels.

A NUTRITIONAL CONTENT OF FOODS

In accordance with the Company's basic principles of providing products which are high quality, useful, and of genuine value to consumers, the manufacture and nutritional fortification of food products is guided by a dynamic nutrition rationale. This rationale takes into account such factors as the changing eating patterns and thus the changing nutrient needs of the consumer, data from dietary surveys, food laws, dietary food standards and nutritional guidelines and governmental appointed committees, social and/or ethnic implications, competitive impact, ultimate cost of nutrition to the consumer, the consumers' impressions of what nutrients a food should contain and, of course, the end use of the product by the consumer.

When considering the nutritional value of foods, their energy content must not be overlooked or underrated. Calories are required for well-being and are necessary to support all physiological processes of the body. Individual requirements for calories vary widely, depending upon age, stage of growth, activity level, and environmental influences, among other factors. Therefore, individuals must adjust their caloric intake to meet their own energy requirements. Since some foods will serve primarily as sources of calories, other food products should provide important nutrients in excess of their caloric content to supplement these primarily energy foods.

In conjunction with the foregoing, it is the policy of The Quaker Oats Company to classify foods by category and produce foods that meet the minimum criteria for their category:

1. Foods associated with the four major food groups:
   - (*a*) Milk group (includes ice cream and cheeses);
   - (*b*) Fruit and vegetable group;
   - (*c*) Meat group (includes fish, dried beans, and nuts);
   - (*d*) Bread and cereal group

These foods will provide balanced [1] nutrition as served, taking into account the nutrients normally contributed by these food classes.

2. Specific natural food replacers: A food designed to replace or to function as a natural foodstuff shall contain at least as much of the desirable significant nutrients as the natural foodstuffs.

3. Specific meal replacers: A food or a group of foods designed to be an entire meal will be formulated to supply at least 25% and no more than 33⅓% of the vitamin and mineral levels currently recognized by

[1] Significant nutrients supplied at equal or greater levels of requirement than calories.

the U.S. government (MDR or RDA) with the exception of energy for the target consumer.

4. Specialty Foods: Foods presented as sources of specific nutrients will contain at least 10% MDR/RDA of these nutrients as served. Foods presented as supplemental sources of nutrients shall offer at least 25% MDR/RDA of the nutrients in question.

No foods shall claim in excess of 100% MDR/RDA for any nutrient except to the extent that the food is clearly designed to substitute for a natural food already exhibiting this level of nutrient. Foodstuffs claiming 100% of the MDR/RDA for most nutrients will be considered special category items and will be limited in number. All foodstuffs will be appropriately and clearly labeled as to their nutritional content.

5. Dietetic Foods: Foodstuffs designed for the purpose of providing low-calorie food for consumers desiring to restrict their calorie intake should provide a reduction in calories of not less than 25% of the level normally associated with the food, or should provide all significant nutrients other than calories at a level of at least ½ greater than the caloric contribution.

6. School Lunch and Other Institutional Foods: Foods designed for public institutional uses, e.g., school lunch programs, will be formulated nutritionally so as to contribute significantly to the total meal being supplied.

7. Fabricated foods not associated with existing foodstuffs: Such foods shall provide all significant desirable nutrients at a level commensurate with the calories they supply as served.

8. Foods having no primarily nutritional objectives: Not all foods should be expected to be primarily nutritious. Fun foods, supplemental items to other foods, etc., will have no imperative nutritional fortification and will carry no nutritional claims.

All Research and Development projects concerned with human foods are reviewed by the Nutrition Research staff, and appropriate nutrition criteria are recommended for all products. This is to assure that all opportunities to provide important and necessary nutrients, either as primary or secondary objectives, are considered. Periodic review of existing products is conducted to determine whether changes in consumption patterns or the development of new technology suggest opportunities to upgrade the nutritional characteristics of established products.

B. LABELING

The Corporate Nutrition Policy with respect to labeling rests on three basic premises—consistency, simplicity, and legality, with the ultimate objective of properly and adequately informing the consumer about ingredients, size, use and nutritional content of the particular product.

Consistency.—The consumer is confronted with thousands of different food products in the retail supermarket. One of the methods a manufacturer can use to provide meaningful and useful information to the often confused consumer is consistency in his labeling practices. This means consistency and uniformity in the wording he uses as well as in the placement of that wording on the package. It means practicing that consistency in all product lines, and it means encouraging other manufacturers to achieve consistency in their labeling. We have worked and will continue to work cooperatively with other manufacturers, with the government and with consumers for uniform and meaningful labeling.

Simplicity.—Simplicity goes hand in hand with consistency. It is applicable to both the words chosen to explain ingredients, suggested size of serving, use or nutritional content and to the appearance and size of the package. Specifically, describing the functions of certain food elements such as vitamins, minerals, protein, etc., in a wide variety of ways should be avoided when such description can lead to consumer confusion. We intend to include on our packages simplified storage and handling directions and package yield instructions (where necessary or desirable). We also will put ingredient lists on all standardized products.

Legality.—Currently, there are several laws and regulations dealing with the kind of information a manufacturer can or must give the consumer on a package of his product and the type of package and material he can use; the number of these laws and regulations is growing. Some of these are general directions and some are extremely specific. It is obviously the policy of The Quaker Oats Company to adhere to the requirements of the law, but our commitment goes beyond the letter of the law to the spirit of the law. We share the stated objectives of laws to adequately inform the consumer.

To help achieve the goals of simplicity, consistency and legality in our packaging and labeling, we have developed the attached format (using the Life Cereal example) to present nutritional information on labels where the product makes a significant nutritional contribution to the diet and such information would be meaningful and helpful to consumers. Where appropriate and meaningful, the function of nutrients with which the public is not generally familiar will be identified. In addition, all labels will state: "Additional nutritional information on Quaker products is available on request." This informs consumers of our willingness to make further disclosures which may be helpful to an individual, but meaningless to the general public.

It will be the general policy of the Company that products displaying the same brand name within product categories shall contain similar nutrient profiles. It is recognized that there may be instances where it is desirable to have a single high nutritional product in a product category (e.g., a high-vitamin pancake mix). If this is done, the label design will clearly differentiate this product from others in the line although a similar trademark will appear. The labels of products which are universally considered to be consumed in conjunction with another foodstuff, or which are recommended to be consumed with another food, may offer nutrient listings of the content of a serving of the product with the contribution of the combined foods for the same nutrients when legally permissible.

We recognize the need to present on labels easily readable, important information, and this legibility is directly associated with proper type size and style, and sufficient color contrast. The Director-Graphic Design, the Corporate Affairs Department and the Law Department will provide guidance to the Product Management Department as to what is acceptable in so far as type size and style and color contrast are concerned.

Objective.—It has been and will continue to be our intent to cooperate wholeheartedly with private and public groups and organizations to achieve the goal of having well-informed consumers using proper informational tools. We recognize that our labels are one of the most significant of these tools.

Format for Nutritive Statement

(Example—Life Cereal)

A one-ounce serving (approximately ¾ cup) of Life supplies the following:

	Weight (mg)	Percent minimum daily adult requirements
Thiamine (vitamin B_1)	1.0	100.0
Riboflavin (vitamin B_2)	1.2	100.0
Niacin	10.0	100.0
Iron	1.5	15.0
Phosphorus	90.0	12.0
Calcium	75.0	10.0
Other nutrients:		
Protein	.005	[1] 18.0
Carbohydrate	.02	[1] 71.1
Fat	.0006	[1] 2.0
Calories—107.		

[1] Percent composition.

Note: Sodium would be listed under MDAR percentages and B_6 and B_{12} would be listed under other nutrients when appropriate for other products.

C. ADVERTISING AND PROMOTION

The advertising of food products must be viewed not only within the context of its ability to persuade consumers to purchase, but also its ability to truthfully and accurately represent the merits of the product. Advertising is an enormously powerful tool capable of motivating millions of consumers. When purchasing a product, the consumer acts in good faith, trusting the manufacturer to have accurately represented the product in its advertising. It is obvious that this environment creates the need for a strong social conscience on the part of the advertiser.

The following are guidelines for the treatment of nutrients/nutrition in the advertising of Quaker food products:

1. All specific facts represented with regard to nutrients or the nutritional performance of the product under normal use must be completely accurate and documentable, as must be any other facts in Quaker advertising.

2. Advertising for products which have no specific nutritional value should not imply nutritional benefits even in the most general way, e.g., "good for you," etc. Only fun, snack, taste, etc. values should be claimed.

3. Advertising for products which supply only a small part of one's daily nutritional requirements should be advertised primarily on the basis of nonnutritional benefits. General statements on nutrition education can be used with such products in the public interest, as long as no implication of high nutritive value for the product results.

4. Advertising for products which have a strong nutritional reason for being should specify and/or imply only those claims which pertain to the nutrients which are contained in relatively high amounts (e.g., ¼ MDAR, high PER, etc.). The primary purpose of advertising nutritious foods, however, is to get people to eat them and frequently appeals on a basis other than nutrition (taste or convenience, for example) can be more effective, these constitute good and appropriate advertising.

Additionally:

Any impression of "physical" benefits should be restricted to those which would actually result from normal usage of the product. Implication of super-human, extreme recuperative powers, etc. should be avoided.

Comparisons with other products to communicate a typically high nutritional value should only be used where the product against which the comparison is made is a recognized source for that nutrient (e.g., eggs for protein, juice or fruit for Vitamin C, etc.)

Efforts should be made to use terminology which will be meaningful and most easily understood by the consumer, e.g., percentage MDAR. The advertising should also present to the consumer a realistic and meaningful basis on which to compare products nutritionally.

Wherever feasible, advertising should attempt to educate consumers. Particular attention should be paid to building educational value into nutritional claims for children's products.

Claims such as super-powered, super-charged and the like should be avoided since no food can truly live up to such claims. The use of "super-personalities" in the fields of physical prowess resulting from use of a single product also should be avoided.

B. NUTRITION EDUCATION

Quaker's primary responsibility is to make high quality products according to our own and other established nutrition guidelines, and to promote them honestly and effectively. The Company recognizes the need for, and strongly supports the development of, improved basic guidelines for food selection geared to modern food technology (similar to the Four Food Groups used now). However, we caution against the extremes of either attempting to make nutrition experts out of the general public, or of over-simplification, particularly in labeling. Both can result in misinformed consumers. Nutrition is a complicated subject, and a good level of nutrition education will not be easily achieved.

The following is an outline of our policy on nutrition education:

1. Broad nutritional understanding will be promoted through the previously-described guidelines for advertising and labeling.

2. The Company will provide nutrition education information messages on its packages. These are not related to marketing claims for the specific product.

3. The Company supports and will continue to support better understanding of nutrition in many ways beyond general advertising and packaging. Among these are:

(*a*) Special publications and programs for schools and women's organizations;

(*b*) Information supplied to food editors;

(*c*) Television programming that contributes to nutrition education;

(*d*) Inclusion of specific nutrition education information, including menu planning, in all recipe books and similar company publications;

(e) Cooperative nutrition education programs with the Nutrition Foundation, the Grocery Manufacturers of America, the Food Council of America, the Cereal Institute, and others;

(f) Special programs designed to reach low-income people, such as the Company's Chicago nutrition course and the experimental work on educational television. A minimum of $25,000 a year will be spent on experimental programs of this type;

(g) Philanthropic grants for efforts which will improve nutrition education among professionals;

(h) Support for joint endeavors to develop better techniques for gaining an understanding of nutrition among consumers.

Pillsbury Nutrition Policy

The Pillsbury Company manufactures food products which will enhance the lives of their consumers through both pleasure and nourishment. This applies to all products bearing the company name and its brands.

The Pillsbury Company will assure its customers true nutritional food value as stated on labels and in advertising.

This will be attained through application of the following policies:

1. Each Pillsbury Company product for which specific nutritional claims are made will be sold on the basis of its medically supported nutritional worth. This means that nutritional claims must be supported by adequate nutritional data, approved by medical counsel.

All foods which substitute for basic food items will be equally nutritious to that which they replace. The nutritional equivalent will be based on the calorie replacement.

We will not engage in:

(a) "Power" races, such as the addition of vitamins in excess of scientifically defined needs.

(b) Advertising claims derogatory to other wholesome, legitimate food products.

(c) Claims on labeling, advertising or brochures that can be construed as medical advice or instructions.

2. Technical research and engineering will maintain an adequate nutritional staff and consultants to support the nutritional program and to authenticate product claims.

3. Guidelines for all nutritional labeling, brochures, consumer correspondence and advertising will be established by each company and submitted to a Nutritional Science Committee designated by the Corporation for approval, prior to publication.

4. Division General Managers will assure that all Pillsbury products are periodically reviewed and updated nutritionally.

General Foods Nutrition Policy

General Foods recognizes its responsibility for the nutrient content of the food products it produces. The company, therefore, will:

Define a scientifically sound nutrient specification for each of its products, except where the product's contribution is known to be primarily social or pleasurable.

Deliver to the consumer a product fully meeting this specification.

Describe clearly on the package label the nutrient content of products, except where the product's role is known to be primarily social or pleasurable.

Reflect the product's nutrient content properly in advertising and promotional materials where appropriate.

General Foods will continue to work with governmental agencies and trade associations to see that valid standards, sound practices, and appropriate laws and regulations relating to nutrition are formulated and put into force.

The Company will also work actively with scientific thought leaders in educational, governmental, and private organizations to combat hunger and malnutrition. (General Foods will promote public understanding of food and nutrition and their relation to people and health at all levels in our society, through schools and information media.)

ITEM 3—ARTICLES OF INTEREST

SUMMING UP AD MEN'S CASE

By Barton A. Cummings*

Peter G. Peterson, when he was Secretary of Commerce, once remarked that "in government, one gets tons of data and ounces of analysis." It's a common experience in business as well, as if the information explosion offered a feast of facts and a famine of understanding.

In October, 1971, a joint committee of the Association of National Advertisers and American Association of Advertising Agencies explained to the Federal Trade Commission the modern techniques of advertising. Edward L. Bond of Young & Rubicam and I functioned as co-chairmen.

In the four and a half days—18 hours—of testimony, the advertising process, its theory and practice, was explained. It was a remarkable exposition—the most coherent, cohesive and comprehensive analysis of the uses of advertising, from research to execution to placement to post-analysis—ever assembled.

The best way to understand it was to sit through it, in the airless chambers of the commission, on the rickety chairs. Not many people did.

After a beginning when the curious and the concerned filled the hearing room, there was usually a sparse crowd. Not many reporters were present and most of them were more concerned with individual testimony than the relationship of one piece of evidence to another.

There is left, of course, the hearing record. It is massive.

The presentation papers—and they omit some of the best demonstrations—are a neat stack, 6 inches high, 700 pages in volume. The transcripts of the record, when they arrived many months later, were some thousand pages of dubious stenotyping, which weigh some 16 pounds. Finally, in the age of electronics, we have 72 cassettes for all the oral testimony and the questions and answers.

This is a mass of data. To sift its meaning, and to condense it into a comprehensible volume, the committee engaged J. Robert Moskin, a former managing editor of Look magazine. He worked three months, editing, sifting, correlating testimony to make it more readable and understandable.

In a book called "The Case for Advertising," Mr. Moskin takes the 700 pages of presentation papers and pares them to 96 pages of terse and pertinent journalism. The bulk of the book comes from the industry presentations, but Mr. Moskin also includes pertinent comments from non-industry witnesses.

The hearings were originally scheduled by the F.T.C. to study advertising addressed to children; to determine whether television advertising may unfairly exploit desires, fears and anxieties; to determine whether technical aspects of the preparation and production of TV commercials may facilitate deception, and to consider consumers' physical, emotional and psychological responses to advertising as they may affect the standards by which advertising is judged.

The industry presentation, which the book summarizes, broadened the discussion to all advertising, not just broadcast.

It seemed necessary to position advertising first for the good it does—and here the main effort was to explain what it does for manufacturers (reduces distribution costs), for retailers (lets them move goods in volume and reduce unit prices) and for media (lets them be independent, because of the widespread economic support they enjoy).

The question of whether advertising is exploitative was discussed by many witnesses. Our point of view is that the consumer is exceptionally able to cope with advertising claims, that he or she is usually keenly aware of product differences in use and that this experience is reflected in repeat purchase.

*Mr. Cummings is chairman of the executive committee of Compton Advertising and chairman of the American Advertising Federation.

A considerable point was made of the existence of a group of consumers that represents high levels of product usage. For instance, 7.7 per cent of total female heads of households drink five or more cups of instant coffee a day, and account for more than 53.5 per cent of total product usage, and 15 per cent of the adult men who use dandruff shampoo twice or more a week, account for 81 per cent of total usage.

The point is that there are groups of consumers who are extraordinarily well acquainted with products and who tend to dominate the purchasing patterns of the total market.

We tried as well to indicate, through both example and research, that consumers typically buy products on different premises.

In paper towels, for example, one advertiser would be stressing absorption, one would be stressing wet strength, and a third would be stressing fashion or decorative appeal (the colors and patterns available to buyers). Each advertiser tries to reach that portion of the market he thinks most responsive to the appeal his product can command.

This adds up to choice, not manipulation, we argued. The book reflects in miniature this key argument.

The question of deceptive techniques in television was handled by demonstration. The Federal Trade Commissioners agreed to move to a studio in Arlington, Va., where Gordon Webber of Benton & Bowles demonstrated commercial techniques, color correction, animation, music, and the retouching and highlight techniques of still photography.

The commissioners had no questions at the end of the demonstration and the question seldom came up thereafter.

The questions of advertising to children were dealt with in considerable detail by Seymour Banks of the Leo Burnett Company.

A key to understanding the problem is that most children see advertising in prime time; that is, they watch television with their families. On the other hand, Saturday morning and Sunday morning get about 14 per cent and 12 per cent of children's viewing, in the 2-to-5 and 6-to-11 age groups.

But clearly, improvements in children's television will probably have to come in commercial television, since 75 per cent of the educational stations are not on the air on Saturday morning and those that are reach less than one-half of 1 per cent of American homes.

The questions of manipulation were dealt with by a variety of witnesses.

Stephen Greyser, a professor at the Harvard Business School, said that the myth of the defenseless consumer was one of the enduring outputs of the social criticism of advertising.

Alvin Achenbaum of the J. Walter Thompson Company argued that no evidence supported manipulation, that the consumer was fickle, and that he changed opinions frequently and deliberately and altered his behavior as he pleased.

Summarizing, Mr. Moskin says that advertising is complex in techniques and effects and that continuing discussion and public understanding are essential. We hope the book helps.

[From the New York Times, Mar. 11, 1972]

SUGAR—IN ALMOST EVERYTHING YOU EAT

By Richard D. Lyons

WASHINGTON.—"If all the 100,000 dentists in the United States restored decayed teeth day and night, 365 days a year, as many new cavities would have formed at the end of the year as were just restored during the previous year." The statement was made by Dr. Abraham E. Nizel of the Tufts University School of Dental Medicine to the Senate Select Committee on Nutrition last week, to emphasize the enormity of this health problem.

Tooth decay is this country's most prevalent disease. Almost all Americans are affected to some degree and the toll in yearly dental bills alone is $5-billion. And the biggest single cause of this problem, a group of nutrition and dental experts told the committee last week, is sugar.

Americans now eat a yearly average of 120 pounds of sugar and sweeteners such as corn syrup and honey. This staggering consumption has increased by 40 per cent since 1909, when the Department of Agriculture started keeping track of such numbers.

And, perhaps even more important, the rise in sugar consumption has been accompanied by a difference in the manner in which it is eaten. Sugar experts say that a generation ago three-quarters of an American's sugar consumption came from a box bought at the grocery; today it's one-quarter. This means that Americans today are shaking only half as many spoonsful of sugar on their food but are eating even more sugar, mainly as an ingredient in "fun foods."

Soft drinks, chewing gum and candy account for one-quarter of our annual sugar binge. But in the switch of American habits to convenience foods, sugar is appearing more frequently in a much wider variety of products besides pastries and ice cream. Robert B. Choate, a Washington consumer advocate who has been warning of the dangers of sugar, told the committee that sugar may be found in the most unlikely foods such as canned corned beef hash and ketchup.

Sugar critics contend that children are being deliberately conditioned by television ads to develop a sweet tooth and that as they grow older they do not know what the taste of real food is without sugar. This, according to the critics, makes food processors better able to market products that have been artificially sweetened because they pander to a falsely enhanced palatability.

During one four-year period in the 1960's the amount of sugar used in processed foods increased 50 per cent. Sugar is now used in some luncheon meats, hot dogs and salad dressings, as well as in canned and frozen fruits and vegetables. And sugar has become increasingly identified with breakfast cereals.

Dr. Jean Mayer, a nationally known nutritionist at Harvard, has repeatedly deplored the increasing sales and promotion of dry cereals formulated with sugar which now account for one-third of the $1-billion-a-year breakfast food market. He told the committee he is especially annoyed because children are being bombarded by television commercials to have their parents buy the products, some of which are more than 50 per cent sugar.

The presence of sugar in the mouth breeds a class of micro-organisms called streptococci mutans. These bacteria in turn secrete substances rich in acids that react with and demineralize the hard outer coating of the tooth. The process is even more insidious because this enamel coating is not uniformly thick so that the thinner layers near the gums and in crevasses between teeth—the areas hardest to clean—are the places most susceptible to decay.

Dr. Mayer told the committee that the promotion of higher sugar cereals, snacks and soft drinks also "may be a factor in increasing the likelihood of diabetes in genetically vulnerable subjects." His point was that many persons are eating sugar unknowingly, including diabetics and persons who do not have clinical diabetes but would develop it by eating sugar. Excess sugar also can lead to obesity, which in turn can produce heart disease.

The sugar-in-everything craze has prompted proposals that ads for such products be banned from television programs normally viewed by children. In addition, a Boston group, named Action for Children's Television, filed complaints

with the Federal Trade Commission last week against seven candy, snack and cereal makers and the CBS Television Network alleging that they are "directing unfair and misleading advertisements to children."

The group complained that children's shows are bombarding their viewers up to 40 times an hour with ads for sugar-rich products presented in such a light that a child becomes indoctrinated into believing that sugar is good.

Some of the companies boycotted last week's Senate hearings, which opened aptly during "American Nutrition Week," saying that if there is blame for over-sugared food it should be shared with the soft-drink, chewing gum and candy makers. But a few cereal companies have reconsidered and will appear when testimony resumes tomorrow.

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