Perception of Veterinarians towards "DIAREX-K"- A need based Expert System for Dairy Cattle Disease Diagnosis

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ABSTRACT

The objectives of the study on which this paper is based, were to develop an IT based expert system on dairy cattle diseases for Continuing Veterinary Education (CVE) of veterinarians and to assess its effectiveness. The veterinarians working in three districts under the Animal Husbandry Department, Kerala were the respondents of the study. The research was conducted in three phases. A needs analysis was conducted to prioritize the dairy cattle diseases based on which the content was developed. Concerned experts validated the content of different dairy cattle diseases before being incorporated into the software tools. The perceived applicability of the expert system 'DIAREX-K' was assessed using a stratified proportionate random sampling to identify participants who then completed a structured questionnaire. The majority of the respondents rated the expert system as highly satisfactory and indicated a favorable attitude toward computer usage. Simplicity and design aspects of the system received top ranking. The findings indicate that it is essential for the organization to take the initiative and motivate the veterinary professionals to use computer-assisted aids such as the expert system as a CVE program to improve their clinical and diagnostic practices.

Keywords*: Information Technology; Expert system; DIAREX – K; Continuing Veterinary Education; Software tools; Cattle diseases; Applicability*

INTRODUCTION

Successful dairy production requires an effective and scientific management system, uninterrupted and adequate supply of critical inputs and delivery of appropriate livestock technology. Veterinarians and farmers are the major stakeholders whereas health and production are the two major service categories in this system. The health service relates to curative and preventive services; while the production includes research and extension services related to livestock husbandry as well as the provision of input supplies such as seed, feed, and artificial insemination (Umali *et al.*1992).

Veterinary professionals are the field level functionaries that link the farmer with the Animal Husbandry Department. They play an important direct role providing health and production oriented services to farmers. That apart, they play an indirect role in the economy of the state by improving the livelihood of farmers via their professional services. Ensuring a constant update of their knowledge and skills is important for veterinarians. This would not only contribute to their professional development but also equip them with the knowledge of scientific advancements in the field of veterinary and animal production. Continuing Veterinary Education (CVE) programs are an important means to impart knowledge of the latest developments, which can be of a formal nature. These include courses such as offered at summer schools, short term courses and in-

service training, or can be informal such as review of professional literature and circulars, attending seminars, conferences, and exhibitions. These traditional methods of CVE have their limitations, namely, being time consuming and expensive. The need for a new method of information dissemination assumes significance. Over the last few decades, Information Technology (IT) has advanced as a tool for processing, retrieving, and disseminating information. Information Communication Technology (ICT) in particular, provides a distinct advantage and enables reaching people directly and supports a two-way information sharing process. One such ICT tool that has received considerable attention recently is expert system. An expert system is a software system that incorporates concepts derived from experts in a field and uses their knowledge to provide problem analysis to the end users. Expert system can also be viewed as a computer programme designed to mimic human thinking while solving a specific problem, based on reasoning. In this study, an attempt is made to develop an Expert system *'DIAREX-K'* for the continuing veterinary education of veterinarians working in the Animal Husbandry Department.

Materials and Methods

The research on which this paper is based was conducted in Kerala a state in India. Three districts namely Wayanad, Thrissur and Thiruvananthapuram were chosen to ensure adequate representation of the three strata in Kerala, that is, highland, midland and the lowland areas. The research was carried out in three steps as follows:

a) Need analysis for prioritizing information needs
b) Development of the expert system *"DIAREX-K"* for CVE of Veterinarians, and
c) Assessment of the applicability of the expert system *"DIAREX-K"*.

The needs analysis was conducted among 90 veterinarians (30 each in the selected districts). In order to prepare the expert system "*DIAREX-K*", visual basic 6.0 and Microsoft access 2007 software tools were used to create a database and to provide user friendly interface. The assessment of applicability of the need based expert system "*DIAREX-K*" in dairy cattle disease diagnosis was studied in terms of 6 variables, namely, utility, simplicity, technicality, feasibility, practicability and user attributes pertaining to the expert system. The procedure developed by Raju (2004) with suitable modifications was followed to measure these variables.

A total of 412 veterinarians working in the three identified districts formed the population of study. Stratified proportionate random sampling was used to select 90 respondents from the three districts (45, 35 and 10 respectively). Data were collected using the personal interview method. The responses of the 90 randomly selected veterinarians were obtained on a three-point scale - agree, undecided and disagree with corresponding scores of 3, 2 and 1. The minimum and maximum scores of the respondents on the items ranged from 24 to 72. The total score of the respondents with regard to each variable was taken into consideration in order to understand the respondent's perception of the variable concerned.

The mean scores of each variable were determined using the following formula:

Mean score of variable = $\dfrac{\text{Sum of scores of all the items under the variable}}{\text{Number of items under a variable}}$

Each variable was then ranked based on the mean scores.

RESULTS AND DISCUSSION

Veterinarians' perception towards the information needs of different dairy cattle diseases

The perception about the information needs of veterinarians for their Continuing Veterinary Education (CVE) in different dairy cattle diseases was studied. Commonly occurring diseases in dairy cattle were classified under five major categories - infectious diseases, parasitic diseases, systemic disorders, reproductive disorders, and poisoning conditions. In each category, the diseases were selected based on the mean scores calculated for each item. Thirty-two diseases were selected for inclusion in the software. Some of the important diseases included were brucellosis, mastitis, acidosis, anaplasmosis, babesiosis, anestrum and poisoning by insecticides and snake venom.

Perception of veterinarians towards the applicability of the expert system "Diarex-k"

Most of the veterinarians that participated in the study (78.9 percent) indicated that they felt highly satisfied with DIAREX-K while the remaining 21.1 percent of them were satisfied with the applicability of the expert system as shown in Table 1. None of the respondents expressed any degree of dissatisfaction with the applicability of the expert system. This finding is in line with that of Kerr *et al.* (1999) whose study reported that the response of dairy farmers in Queensland toward the DAIRYPRO expert system was satisfactory. So too, the study by Balasubramani & Swathilekshmi (2008) in which the researchers reported that the majority of the rubber growers (81.67 percent) were most satisfied with the use of the expert system RUBEX-04. Nisha (2008) in a study among the dairy farmers and extension personnel of Erode and Kanchipuram districts in Tamil Nadu reported that the overall perception of the respondents towards the dairy advisory system ranged from satisfactory to more satisfactory.

Table 1: Distribution of veterinarians based on their perception towards the applicability of the expert system

Sl. No.	Perception of the applicability of the expert system	Frequency (f)	Percentage
1	Highly dissatisfied (24 - 32.8)	0	0.00
2	Dissatisfied (32.8 – 42.6)	0	0.00
3	Ambivalent (42.6 – 52.4)	0	0.00
4	Satisfied (52.4 – 62.2)	19	21.10
5	Highly satisfied (62.2 - 72)	71	78.90
	Total	90	100.00

Perception of veterinarians towards the different components of applicability of the expert system

Veterinarians perceived the system as being simple to use as evidenced by the highest mean score for this domain. This was followed by design (2.73), feasibility (2.70), utility (2.69), user attributes (2.66) and technicality (2.44) of the system as shown in Table 2. Similar findings were reported by Raju and Rao (2006) in their study on the perception of the Poultry Expert System (PES) by the veterinarians in the Nizamabad district and undergraduate veterinary students at the Hyderabad veterinary college.

The icons provided on each page of the *"DIAREX-K"* had the distinct advantage of directing the user in a sequential manner making it a user-friendly software in diagnosing the diseases. This

could be the reason the respondents ranked the design of the expert system second. Raju & Rao (2006) reported that respondents perceived the PES design as good.

The feasibility and utility aspects of the software were ranked third and fourth respectively. The comparatively lower satisfaction of the respondents with these aspects might be attributed to their lack of experience in using the expert system. It is likely they were not able to predict the cost effectiveness of the system. Raju and Rao (2006) reported that the PES was perceived as good in terms of its utility and feasibility. Similar findings were reported by Nisha (2008).

Observation of the ranking pattern shows that user attributes and technicality were ranked fifth and sixth respectively. Similar findings were reported in a study conducted by Helen & Kaleel (2009) among Palakkad district extension personnel. In this context, having reviewed the findings of a study conducted by Boonstra & Broekhuis (2010), it would be worth discussing the illustration of professional autonomy as a psychological barrier in acceptance of electronic medical records (EMR) among the Nederland physicians participating in the study. The participants noted that professional autonomy played a very important role in the working practices of physicians. Professional autonomy is defined here in the context of the professionals having exclusive control over the conditions and processes and procedures that govern their work. With the implementation of EMRs, physicians were concerned about the loss of their control over patient information and working processes since these data would be shared with and assessed by others. The authors concluded that physicians' perception of the threat to their professional autonomy was very important in their reaction to EMR adoption.

Table 2: *Perception of veterinarians towards the different components of applicability of the expert system*

Sl. No.	Aspects of applicability of expert system	Mean score	Rank
1	Utility	2.69	IV
2	Simplicity	2.90	I
3	Technicality	2.44	VI
4	Feasibility	2.70	III
5	Design	2.73	II
6	User attributes	2.66	V

CONCLUSION

The study on which this paper is based was started with an objective of developing an IT based expert system on common dairy cattle diseases for the Continuing Veterinary Education (CVE) of veterinarians and to assess the effectiveness of the expert system developed. Most of the veterinarians sampled from three districts in Kerala indicated that they felt highly satisfied with *'DIAREX-K'* as their CVE program and none of the respondents expressed any degree of dissatisfaction with the applicability of the expert system. This finding suggests that it is essential for the organization to motivate the veterinary professionals to use computer-assisted aids such as expert system to improve their knowledge in their clinical and diagnostic practices.

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