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Knowledge Index for Measuring Knowledge and Adopting Scientific Methods in Treatment of Reproductive Problems of Dairy Animals

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Abstract

Reproductive problems among dairy animals are one of the major causes of loss in dairy sector. These problems can be tackled by imparting appropriate knowledge to the livestock owners. An attempt was made to measure the knowledge of livestock owners by developing a knowledge test on reproductive problems of dairy animals. The study was undertaken in Karnal district of Haryana state, India. Data were solicited from 300 livestock farmers who had at least one milch animal at the time of investigation. In addition to developing schedules for socio-economic variables, a knowledge test was also developed for measuring knowledge construct. Data were solicited on scientific treatment of affected dairy animals and 59.54% knowledge was observed on reproductive traits. Study indicates that majority of livestock farmers adopted scientific methods for treating their animals. Respondents' age, extension contact and milk production were positively and significantly correlated with knowledge. Therefore, imparting quality practical training and periodical assessment of performance of lay inseminators for improving their skills and knowledge regarding estrus detection and insemination needs to be emphasized. Extension machinery has to be an ideal bridge between research/development institutions and dairy farmers for their catalytic effect (Meena & Malik, 2009). Extensive awareness programs are needed for inculcating scientific outlook among livestock farmers on these complex problems. Easy accessibility of veterinary hospital at village level can reduce the adoption of indigenous technical knowledge in treatment of these complex problems.

Keywords: reproductive problems, livestock owners, knowledge, scientific treatment

1. Introduction

Dairy animals' reproductive diseases result in economic losses caused by decreased production as well as increased treatment and preventive measurement costs. Reproduction can be negatively affected in many ways (Bellows & Short, 1994). Retained placentas and cesarean delivery can result in a prolonged postpartum interval to conception, causing increased days open and decreased milk production (Barkema et al., 1992; Van Werven, 1992). Infertility regardless of cause is a major reason for culling the animals. Culling due to repeat breeding adds significant cost to milk production (Beever, 2006). Hence, maintaining infertile animal is an economic burden on dairy owners. By and large, 10-30% of lactation in cattle is affected by infertility and reproductive disorders. Repeat breeding (Meena et al., 2008; Meena & Malik, 2009), anestrus (Meena & Malik, 2009) and infertility (Meena et al., 2008) are some of the prominent reproductive problems under Indian conditions. However, extreme climate also affect the reproductive efficiency (Nanda et al., 2003). About, 13.6% to 18.2% wrong inseminations were perceived under Indian conditions (Kaul & Prakash, 1993). Jeyakumari et al. (2003) estimated economic impact of postpartum reproductive disorders as 21.01% and 34.25% in university and private farms, respectively. Loss was more in prolapse, followed by retained placenta and metritis. Productive and reproductive performance of dairy animals is largely affected by inadequate dietary management and health coverage against existing and emerging diseases. Imbalanced concentration of minerals is one of the possible causes of reproductive problems (Ahmet et al., 2008). The major constraints identified in eradicating reproductive problems were lack of facility of veterinary doctors during night, high incidence of repeat breeding, and lack of good quality bulls at village level

(Meena & Malik, 2009). Since, reducing infertility is vital for better reproductive performance, hence proper knowledge of reproductive problems acts as a change vehicle for desired change in enhancing dairy animal's fertility. Hence, an attempt was made to measure the knowledge of livestock owners on reproductive problems; and scientific amelioration of these problems.

2. Research Methods

2.1 Locale of Study and Sampling Plan

The study was conducted in Karnal district of Haryana state, India. Haryana is situated in northern region of India flanked by Punjab, Rajasthan, Delhi and Uttar Pradesh. Karnal district lies between $29^0$09'50" and $29^0$59' north latitude and $76^0$31'15" and $77^0$12'45" east longitude at 235 and 252 meters mean sea level. Climate ranges from dry and hot summers to cold winters. Average annual rainfall is about 744.7 mm. All six blocks of Karnal district namely, Karnal, Gharaunda, Nissing, Nilokheri, Assandh and Indri were selected for this study. Using random sampling technique two villages from each of the six blocks and 25 farmers (5 farmers from each category i.e. landless, marginal, small, medium and large) from each village were selected. Thus a total of 300 farmers constituted the sample. However while selecting the farmers it was kept in mind to select only those farmers who had at least one milch animal. Schedules were developed for measuring the socio-economic (education, social participation, family size, land holding, milk production, milk consumption, milk sale and herd size), psychological (economic motivation and attitude towards dairy farming) and communicational variables (extension contact and mass media exposure). A knowledge test was developed to measure the knowledge of livestock owners on reproductive traits. Data were solicited through personal interview method.

2.2 Development of Knowledge Test

A knowledge test was developed using the procedure described by Linguist (1951).

a) Collection of items: The content of knowledge test is composed of questions called items. A comprehensive list of items of reproductive traits of dairy animals was prepared by consulting of relevant literature and experts of National Dairy Research Institute, Karnal. The veterinary assistant surgeons and stockmen further validated the applicability and suitability of these traits in the study area. Criteria for the items selection were (i) It should promote thinking (ii) It should have a certain difficulty, and (iii) It should differentiate well informed from less informed. Using this method, a total of 49 items on reproductive traits were selected to form the initial test index/battery to carry out item analysis for developing a knowledge test.

b) Form of questions: All 49 items formed the knowledge test and the questions were objective and dichotomous to facilitate easy and objective scoring.

c) Pre-testing and item analysis: Preliminary test consisting of 49 statements were administered to 30 non-sample respondents of study area and their responses were obtained and subjected to difficulty index, discrimination index and point-bi-serial correlation as given below:

i) *Difficulty index:* The difficulty of an item varies from individual to individual. When a respondent answers a question/item correctly, it was assumed that the question was less difficult for him. The assumption in this question/item statistics of difficulty was that difficulty was linearly related to level of respondents' knowledge about reproductive traits. The difficulty index for each of the 49 items was calculated by dividing the total correct responses for a particular question/item by total number of respondents as under

$$D_I = \frac{N_C}{N}$$

Where, D_I = Difficulty index;

N_C = Number of respondents answering correctly;

n = Total number of respondents.

ii) *Discrimination index:* If the statement is answered by some respondents correctly and not by others, such a statement has greater power to discriminate more knowledgeable from less knowledgeable ones than another statement which is either answered correctly by everyone or none in the sample. If a statement is so simple that it can be correctly answered by everyone or is too difficult to be correctly answered by anyone, it does not have power to discriminate among respondents' with varying level of knowledge. In a way, the items carrying higher discrimination power implicitly indicates that such items are moderately difficult, and they are the ones that discriminate between the ones who answer it correctly from those who are unable to do so. The discrimination power of all the 49 items were worked out by following method.

First, respondents were arranged in descending order on basis of their performance in whole test. Out of this list, top 27% and bottom 27% of respondents were treated as high and low groups. For each question, number of top 27% (N_H) and bottom 27% (N_L) who answered it correctly were counted. The discrimination index was calculated as under.

$$D_i = \frac{N_H - N_L}{n}$$

Where, D_i = Discrimination index;

N_H = Number of respondents in 27% high groups who answered correctly;

N_L = Number of respondents in 27% low group who answered correctly;

n = Number of respondents in 27% sample.

iii) *Point bi-serial correlation:* The main aim of calculating point bi-serial correlation was to work out the internal consistency of items that is the relationship of total scores to a dichotomized answer to any given item. In a way, validity power of item was computed by correlation of individual item of whole test. Point bi-serial correlation for each of item to preliminary knowledge test was calculated (Garrett, 1966).

$$r_pbis=(M_p-M_q)/SD\times P.Q$$

Where,

r_pbis = Point bi-serial correlation.

M_p = Mean of the total scores of the respondents who answered the item correctly.

M_q = Mean of total scores of respondents who answered item incorrectly.

SD = Standard deviation of entire sample.

P = Proportion of respondents giving correct answer to item.

Q = Proportion of respondents giving incorrect answer to item.

The calculated point bi-serial correlation was tested with (N-2) degree of freedom.

iv) *Final selection of items:* The items having difficulty index between 0.25-0.75, discrimination index above 0.20 and bi-serial correlation significant at 5% level were finally selected for final knowledge test. A total of 20 items constituted the knowledge test.

v) *Reliability of knowledge test:* The reliability of test was assessed by using split half technique. The test consisting of 20 items was administered to 30 respondents selected randomly in non-sample areas. The responses to all the twenty items were scored as 1 for correct and 0 for incorrect. The total scores obtained by each of the respondents on odd and even numbered items in respect of two halves of test were calculated separately. The Pearson product moment correlation coefficient between the two sets of scores was calculated. The 'r' value thus calculated as 0.79 which was significant at 1% level of probability. Thereby, indicating that this test had high internal consistency.

vi) *Validity of knowledge test:* The validity of knowledge test was established through content validity. All possible care was taken in incorporation of the statements covering all aspects on reproductive traits. All the statements were subjected to item difficulty, discrimination index and point bi-serial correlation before selection of the final statements. Hence it was logical to assume that the test satisfies representation as well as sensible method of test construction, the criteria for contest validity.

Knowledge test consisted of 20 statements. For an individual livestock farmer, minimum and maximum knowledge scores were 20 and 60, respectively. Each trait measured independently and an overall knowledge was also calculated through the knowledge index.

$$\text{Knowledge Index} = \frac{\text{Score obtained by respondents}}{\text{Maximum obtainable score}} \times 100$$

3. Results and Discussion

3.1 Socio-economic Attributes of Farmers

Table 1, describes the socio-economic attributes of the farmers. A perusal of this table revealed that about 47 percent belonged to young age (<31 years) however, nearly 44 percent were in the middle age category ranging from 31 to 49 years. Only one-tenth belonged to old age category (49 years). Most of the farmers (50.34%) were educated up to 5th standard however one-fourth of total were illiterate (26%). Nearly one-tenth (13%) were educated up to 8th standard. Only a few farmers had secondary and higher educational qualifications. Social