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Test to Measure Farmers' Knowledge on Management of Parasitic Infestation in Dairy Animals

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ABSTRACT

The test was developed during in 2022 in the Bareilly district of Uttar Pradesh state to measure farmers' knowledge on management of parasitic infestation in dairy animals. A total number of 86 items were subjected to experts for relevancy testing and finally selected 69 items for the item analysis. These 69 items were pretested on 36 respondents from other than the study area. Based on the item analysis score, difficulty and discrimination index were calculated. The items with difficulty index ranging from 30 to 80, discrimination index above 0.3 were selected. Ultimately, 30 items were selected for the final knowledge test for dairy farmers on management of parasitic infestation. The reliability of the developed test was measured by using Cronbach's alpha method and found to be 0.8. The overall test content validity index (CVI) was found to be 0.93 which considered fit for test. Thus, the reliability and validity of the current test indicate the consistency and precision of the results. The developed test will help in assessing the knowledge level of farmers regarding parasitic infestation management and accordingly, the awareness and training programs can be planned to enhance the knowledge level of farmers.

INTRODUCTION

India is an agriculture-based developing country owning vast livestock resources (535.8 million) and growing at a 6.48 Compound Annual Growth Rate (CAGR), which is significantly higher than the CAGR of the human population i.e., 1.29 per year (Vision-2022, 20th livestock census). A rapidly growing population's ever-increasing food demands have been met by the introduction of crossbreeds (Michael et al., 2022). Consequent to the government's sound interventions such as crossbreeding to upgrade the animal breeds, cognizable increase in production traits along with undesirable genetic changes led to higher disease incidence (Hare et al., 2006). As a result, on one hand, the livestock sector has put the country on the global map for being the world's largest milk-producing nation, accounting for 22 per cent of global production (DADH&F Report, 2020-21). On the other side, disease-related losses, as well as their prevention and treatment expenses are a stumbling block to livestock's efficient growth. In addition to infectious diseases, parasitic infestation also causes significant economic losses as the prevalence of GIP in ruminants ranges from 44.2 to 93.4 per cent (Hirani et al., 2006). External parasites, particularly ticks, cause direct loss through blood loss, damage to hide, loss of body weight, and reduced milk yield (Sharma, 1984). Moreover, indirect losses are caused as these ticks' act as a vector for protozoa (Soulsby, 2006). Veterinary healthcare services play a significant role in the prevention of parasitic infestation as a study conducted by Kumar and Meena, 2021 revealed that 44.38 per cent of respondents were moderately satisfied with healthcare

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services. For control of parasites, farmers have principally relied on the indiscriminate use of anti-parasitic drugs resulting in the development of resistance. Further, long-term use is often accompanied by contamination of the environment, milk, and meat with drug residues (Ghosh et al., 2006).

The most important variables attributing to the parasitic infestation are lack of knowledge and awareness as these affect farmers' perception and attitude towards decision making. The research by Sazmand et al., (2020) on parasitic disease and parasiticide resistance, evidenced that most farmers had no knowledge of the clinical signs allied with parasitism and never heard about resistance. Zvinorova et al., (2016) in their study in Zimbabwe reported that the majority of farmers had the knowledge and get health care services, despite this about 57.9 per cent of the farmer did not control the parasitic infestation. It has been presumed for a long time that a higher knowledge level helps in improving the health and efficiency of farms. If we want to advance dairy farmers or upgrade their status, then we have to modernize their knowledge, adoption and socio-economic status (Ghalawat et al., 2022). Therefore, it is important to measure the knowledge level of farmers regarding parasitic infestation in dairy animals and formulate a strategy to bridge this knowledge gap in order to prevent dairy animals from being infested by parasites and associated diseases. Till date, no instrument is available to measure the knowledge of farmers regarding parasitic infestation in livestock. Therefore, a knowledge test has been developed regarding parasitic infestation in dairy animals. This developed tool will help in assessing the knowledge level of farmers regarding parasitic infestation in dairy animals.

METHODOLOGY

The knowledge test on management of parasitic infestation was developed by using the standard methodology. The knowledge test comprised multiple choice questions (items) on parasitic infestation management. A total of 86 items were collected and edited following 14 informal criteria as suggested by Edwards (1957). The items were subjected to scrutiny by an expert panel of judges (50 Nos) to check their relevancy and a total of 25 responses were obtained in time. The relevancy score of each item was established by adding the scores on the rating scale for all the judges' responses. From the responses two type of scores *viz.*, the relevancy weightage (RW) and mean relevancy score (MRS) were calculated for all the selected items individually by using the following formulas:

The total 69 items were selected accordingly based on the experts score. Item analysis was carried out using difficulty and discrimination index. These indices were calculated for all 69 items by using the following formulas:

$$P = \frac{n}{N} \times 100$$

Where, P = Item difficulty index in the percentage, n = Number of the respondents giving the correct answer to items, N = total number of respondents to whom the items were administered. The discrimination index calculated by using E1/3 formula:

$$E/3 = \frac{(S1+S2)-(S5+S6)}{N/3}$$

Where, N = Total number of respondents to whom the items were administered. S1 and S2 are the frequencies of correct answers of the highest and higher scores, respectively. S5 and S6 are the frequencies of correct answers of lower and lowest scores, respectively. A similar methodology was followed by Kumar et al., (2016); Vijayan et al., (2022).

In the present study, Cronbach's alpha was used to test reliability with the following formula:

$$\alpha = \left(\frac{K}{K-1}\right)\left(\frac{S_y^2 - \sum S_i^2}{S_y^2}\right)$$

Where, K is number of items in test, S_y^2 Variance associated with total observed score, S_i^2 Variance associated with individual item score.

For standardization of developed test, the Item Content Validity Index (I-CVI) was calculated by using following formula:

$$\text{I-CVI (Item-content validity index)} = \frac{\text{No. of agreements per item}}{\text{Number of experts}}$$

Then, S-CVI was calculated for the overall test. It was determined to check for the stability of each dimension as well as the scale as a whole. The S-CVI was calculated from the following formulas:

$$\text{S-CVI (Scale-content validity index)} = \frac{\text{I-CVI}}{\text{Number of items}}$$

RESULTS AND DISCUSSION

For the current study, the construct was knowledge about the management of parasitic infestation in dairy animals. Finally, 86 pooled items were retained from various dimensions.

Relevancy weightage and mean relevancy score were calculated for all the 86 items based on the experts' responses. The items having relevancy weightage of more than 0.80 and mean relevancy score of 4.00 or more were selected. As a result, a total of 69 items were selected for the item analysis. A similar method was used by Shruti et al., (2022) for relevancy testing.

$$\text{Relevancy weightage} = \frac{(\text{Most relevant} \times 5) + (\text{Somewhat relevant} \times 4) + (\text{Relevant} \times 3) + (\text{Least relevant} \times 2) + (\text{Not relevant} \times 1)}{\text{Maximum possible score}}$$

$$\text{Mean relevancy score} = \frac{(\text{Most relevant} \times 5) + (\text{Somewhat relevant} \times 4) + (\text{Relevant} \times 3) + (\text{Least relevant} \times 2) + (\text{Not relevant} \times 1)}{\text{Number of judges}}$$

The selected 69 items were subjected to thirty-six dairy farmers of Kalapura village of block Shahgang in the non-sample area. Based on respondents' scores, the difficulty index and discrimination index were calculated. The difficulty index (P) was calculated as the percentage of respondents giving correct responses to that particular item. It was calculated with the objective to eliminate the items that were extremely difficult or extremely easy. The difficulty index is maximum at the range of 30 and 70 per cent and these items are considered excellent. The higher the P-value, the easier the items. In this study, the items having P value between 30 to 80 were considered and incorporated into the final knowledge test. Items with a discrimination index above 0.3 were selected for the final knowledge test. Eventually, 30 items were selected for the knowledge test which would differentiate the highly knowledgeable personnel from the less knowledgeable ones. Based on the results of difficulty and discrimination index, final selection of items was done. A total of 30 (Table 1) items were included in the final format of the knowledge test.

The developed knowledge test was standardized by testing the reliability and validity which were ascertained using Cronbach's alpha and content validity, respectively. Cronbach's alpha value was calculated and found to be 0.883 and the knowledge test constructed was highly stable and reliable. For content validity, I-CVI was computed through the panel of experts. The total 6 experts have been selected as with the increase in number of experts the probability of attaining total agreement decreases (Wynd et al., 2003). In order to do this, the final 30 items were given to experts and they were asked to respond on a four-point continuum *viz.*, 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant and 4 = highly relevant. The value of I-CVI of all the items was more than 0.79 which indicates that the developed test was highly consistent. Similarly, S-CVI is calculated using the number of items in a tool that have achieved a rating of "very relevant". The S-CVI/Ave is calculated by taking the sum of the I-CVIs divided by the total number of items. A S-CVI/Ave $\geq$ 0.9 have excellent content validity. For the current test, the calculated value of S-

Table 1. Difficulty index, discrimination index, and I-CVI of the knowledge items on management of parasitic infestation (final items)

S.N.	Items	Difficulty Index	Discrimination Index	Agreement between experts	I-CVI
1	The animal shed should have… Well ventilation and lighting/ Poor ventilation and lighting/Only proper ventilation/ No effect of ventilation and lighting on parasites	61.11	0.50	5	0.8333
2	Animal house should be free from……. Wildlife hosts/ Cracks and cervices/ Hidden spaces/All	69.44	0.42	6	1
3	Cattle and buffalo should be housed Mixed/ Separately/ Both/None	33.33	0.42	4	0.6666
4	Animals should be brushed……. Daily/Monthly/Once in 6 months/Yearly	38.89	0.42	6	1
5	Manure can be disposed of by…… Throwing in wasteland/Throwing in grazing land/Composting	69.44	0.42	6	1
6	Pasture should be……. Rotated/Alternated/Same pasture for all animals	55.55	0.58	5	0.8333
7	Pasture should have sufficiently……..grasses Long/Short/Mature/Immature	61.11	0.50	6	1
8	The dung of grazing animals on pasture…… Left as such/Pick and throw outside/Dragging or harrowing	69.44	0.42	6	1
9	Grazing time……. Start early morning (before 8 am)/During sunlight (after 9 am to 5 pm)/ Late evening (after 5 pm)	41.67	0.42	6	1
10	Parasitic infestation is more in…….. Feedlot system/Grazing system/Same in both/None	69.44	0.42	5	0.8333
11	Animals that have heavy tick infestation should…… Isolate and treat/Cull/Left as such	36.11	0.33	6	1
12	Deworming schedule in calf (up to 6 months) First treatment between 14-21 days and repeat after 35-42 days/First treatment just after birth and repeat after 15 days/First treatment just after birth and repeat after 1 month	63.89	0.50	6	1
13	Deworming of the adult lactating animal should be done….. Only when an animal show symptom /Only after confirmatory diagnosis/ Always before monsoon season	69.44	0.42	6	1
14	Overdosing of anthelmintic may lead to Increases withdrawal times/Toxicity/ resistance in animals/Becomes costly/All	30.56	0.50	5	0.8333
15	The animal should be kept off feed……. anthelmintic treatment Before/After/Both before and after/No need of fasting	52.78	0.42	6	1

Table 1 contd...

S.N.	Items	Difficulty Index	Discrimination Index	Agreement between experts	I-CVI
16	Acaricides should be applied…… Once in rainy season/Twice in the rainy season (before and after)/ Always when see parasites/No application strategy	66.67	0.50	6	1
17	Overdosing of acaricide may lead to….. Contamination of environment/Toxicity in animals/Acaricide resistance/All	58.33	0.42	5	0.8333
18	Ticks, mites, lice and mosquitos are which types of parasites? Internal parasites/External parasites/Both/None	58.34	0.58	6	1
19	The diseases which are related to ticks? Trypanosomiasis/Theileriosis/Babesiosis/All	58.33	0.42	5	0.8333
20	The endoparasites cause type of losses in animals…. Milk production/Bodyweight/Growth rate/All	47.22	0.42	6	1
21	The ectoparasites cause type of losses in animals…. Blood loss and growth rate/Toxin production/Hide damage/All	72.22	0.50	5	0.8333
22	Which type of animal has more parasitic infestation? Poor body condition/Normal body condition/Well-nourished animals/All	58.33	0.50	6	1
23	Which type of breed have more parasitic infestation? Crossbred/Indigenous/Non-descript/All	72.22	0.42	6	1
24	Does the age of animals affect the infestation rate? Young animals have more endoparasites/Adult animals have more endoparasites/Both are equally affected/No idea	38.89	0.33	4	0.6666
25	The most favorable season for tick infestation…. Winter/Summer/Spring/No seasonal variation	44.44	0.33	6	1
26	Source of infestation for internal parasites Eating grasses contaminated with infected animals' faeces/Contaminated water and soil/Snail/All	36.11	0.42	6	1
27	Source of external parasites…. Animal shed/Contact with infected animal/Infected grazing pasture/All	41.67	0.58	5	0.8333
28	Effect of parasitic infestation on the reproductive system…. Delayed puberty/Low heat/Poor conceive/All	58.33	0.42	6	1
29	Effect of parasitic infestation in pregnant animals….. Abortion/Stress/Congenitally defected calves/All	72.22	0.58	6	1
30	If the animal is having distended abdomen, bottle jaw condition and oozing blood from the anus what could it be? GIP infestation/Some feed allergies/ toxins/Stress/All	52.78	0.42	6	1
	S-CVI/Avg				0.9333
	Total agreement				20

CVI/Avg of all the test items was 0.933. Hence the knowledge test constructed was highly stable and valid. The findings are in line with the result of Handage & Chander (2021) research on content validation process.

The final knowledge test comprised of 30 items that would measure the knowledge level of dairy farmers regarding parasitic infestation management in dairy animals. The test can be administered in dichotomous form viz., Yes or No. The overall score of the individual toward the knowledge level of dairy farmers regarding parasitic infestation management in dairy animals could range from 0-30.

CONCLUSION

The dairy farmers are not well equipped with the knowledge regarding the appropriate and effective management of parasitic infestation in animals. Because of these gaps, parasite infestations are the main obstacle to obtaining desired production and productivity. Therefore, it is critical to know the parasitic management practices knowledge among dairy farmers that help in formulating needed policies and efforts to create alertness. Consequently, an effort has been made to develop the knowledge test with respect to parasitic infestation management in dairy animals. This developed knowledge test will help in assessing the knowledge level of dairy farmers accordingly awareness and training program would be designed. The provision of awareness and training programs to farmers with respect to parasitic infestation will enhance the knowledge level of dairy farmers. This increased knowledge level can prevent the animals from parasitic diseases load which will benefit animal health and the income of farmers ultimately.

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