Knowledge Test Development for Dairy Farmers To Measure Knowledge Level About Scientific Dairy Farming Practices

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Abstract

In the present study, a test was developed to measure the knowledge level of dairy farmers about scientific dairy farming. A preliminary set of 87 knowledge items was initially administered to 60 randomly selected dairy farmers for item analysis. The difficulty index and discrimination index was found out, and the items with difficulty index ranging from 30 to 80 and the discrimination index ranging from 0.30 to 0.55 were included in the final format of the knowledge test. A total of 48 items which fulfilled both the criteria were selected for the final format of knowledge test. Reliability of the test through split half method was found out to be 0.386 and the coefficient of correlation value by the test-retest method was 0.452, which was found to be significant at 1% level of significance. Hence, the knowledge test constructed was highly stable, reliable and validated for measuring what it intends to.

Keywords: Knowledge, Scientific dairy farming, Test.

Ind J of Vet Sci and Biotech (2019): 10.21887/ijvsbt.14.4.18

Introduction

Dairying accounts for more than two-third of the livestock output and is largely responsible for the rising importance of the livestock sector in India (Kumar *et al.*, 2011). Owing to the changing trend in dairying, awareness of the current dairy farming systems would be much helpful to the stakeholders involved in livestock development (Manivannan and Mathialagan, 2016). So assessment of the existing knowledge of dairy farmers on scientific dairy husbandry will give an idea for proposing any future intervention to increase the knowledge of farmers on scientific dairy farming. In this regard, a scale has been developed with multiple choice questions, yes or no questions and some open-ended questions. The test has been prepared with utmost care with the variables in the study indicated the extent of knowledge of dairy farmers on breed, feeding, breeding, housing, health management, calf management and some general management aspects of dairy farming.

Methodology

Item Collection

The content of the knowledge test is composed of questions called items. Items for the test were collected from different sources, such as literature, field extension personnel, subject matter specialists, scientists, professional colleagues and the researcher's own experience on scientific dairy farming. The questions were designed to test the knowledge level of dairy farmers on scientific management of the dairy farm.

Initial Selection of Items

The selection of items was done based on the following criteria:

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- It should promote thinking rather than rote memorization, and
- It should differentiate the well-informed dairy farmers from the poorly informed ones and should have certain difficulty value.

Keeping in mind all these criteria, 87 items were initially selected encompassing the major areas of scientific dairy farming considering the level of knowledge of dairy farmers. A schedule was prepared with these 87 items, on different formats like multiple choice questions (MCQs), Yes or No questions and some open-ended questions for administering them to the farmers for item analysis and screen out non-relevant and weak items. Correct replies for the items were ascertained in consultation with specialists and experts.

Preliminary Administration of Test

The items were checked and modified on the basis of pre-testing and administered to 60 randomly selected dairy farmers for item analysis. Each one of the 60 respondents,

was given score 1 or 0 for each item according to whether the answer was right or wrong. The total number of correct answers given by a dairy farmer out of 87 items was the knowledge score secured by him/ her. After calculating the scores obtained from 60 dairy farmers, the scores were arranged in descending order. These 60 dairy farmers were then divided into 6 equal groups (G1, G2, G3, G4, G5, and G6) each having 10 dairy farmers. Dairy farmers in each group were arranged in descending order according to the total score obtained by each one of them. Only four extreme groups with high and low scores were considered for computation of item difficulty and item discrimination indices.

Item Analysis

Guilford explored that the item analysis of a test yields two kinds of information: item difficulty and item discrimination. The index of item difficulty revealed how difficult an item was whereas the index of discrimination indicated the extent to which an item discriminates to well-informed individuals from the poorly informed ones.

Item Difficulty Index (Pi)

The difficulty index of an item was defined as the proportions of dairy farmers giving correct answers to that particular item. This was calculated by the formula:

$$Pi = ni/Ni \times 100$$

where, Pi = Difficulty index in the percentage of ith item.

ni = Number of Dairy owners giving the correct answer to the ith item.

Ni = Total number of Dairy owners to whom the ith item was administered.

Item Discrimination Index

The discrimination index was obtained by calculating the Phi-Coefficient as formulated by Perry and Michael (1951). However, Mehta (1958) in using E1/3 method to find out item discrimination emphasized that this method was analogous to, and hence, a convenient substitute for the Phi-Coefficient. The method suggested by Mehta (1958) was adopted for the present study. The formula by which the item discrimination index was calculated is given below:

$$E^{1/3} = \frac{(S_1 + S_2) - (S_5 + S_6)}{N/3}$$

Where, S1, S2, S5, and S6 were the frequencies of correct answers in G1, G2, G5, and G6 groups respectively, and N = Total number of livestock owners in the sample of item analysis.

RESULTS AND DISCUSSION

Selection of Items for the Test

In the present study, items with difficulty index ranging from 30 to 80 and the discrimination index ranging from 0.30 to

Table 1: Final items of knowledge test on scientific dairy farming practice along with their difficulty index and discrimination index

Sl. No.	Items	Correct answer	DI index	Disc. index
Knowledge on breeds				
1.	Which cattle breeds are more disease resistant?			
	(a) Indian Cattle breeds, (b) Exotic cattle breeds	Indian Cattle breeds	80	0.35
2.	Which Indian cattle breeds are best milch breeds?	Sahiwal, Red–sindhi	75	0.3
3.	Which exotic cattle breed has the lowest milk fat percentage?			
	(a) Jersey, (b) Holstein-Friesian, (c) Brown-Swiss, (d) Red-Dane	Holstein–Friesian	58.33	0.4
4.	Which exotic cattle have the highest milk yielding capacity?			
	(a) Jersey, (b) Holstein-Friesian, (c) Brown-Swiss,)d) Red-Dane	Holstein–Friesian	68.33	0.5
Knowledge on feeding practices				
5.	How much concentrate is fed to the dairy animal for every 2–2.5 liter of milk production?			
	a) 0.5 kg, (b) 1 kg, (c) > 2kg, (d) None of these	1 kg	53.33	0.35
6.	Total dry matter requirement of cattle & buffalo is around…………. % of their body weight?			
	a) 2-3%, (b) 5-7%, (c) 10%, (d) 20%	2–3%	48.33	0.3
7.	Concentrate feeding to animal should be practiced			
	(a) Individually, (b) in group	Individually	78.33	0.3
8.	How much quantity of extra concentrate to be fed to animals in advanced pregnancy?	1–1.5 Kg	46.67	0.4
9.	The dairy animals should be offered …………….. kg green fodder daily?			
	(a) 10 kg, (b) 15-20 kg, (c) 25-30 kg, (d) 50 kg	25–30 kg	56.67	0.35
10.	Mineral mixture should be included ………. % of total feed.			
	a) 1%, (b) 5%, (c) 10%, (d) 20%	1%	70	0.4

Sl. No.	Items	Correct Answer	DI Index	Disc. Index
11.	Optimum concentrate to roughage ratio in high yielding animals is ………			
	(a) 50:50, (b) 20:80, (c) 90:10, (d) 70:30	70: 30	42.29	0.45
12.	Hay is a preserved form of feed?			
	(a) Yes, (b) No	Yes	73.33	0.35
13.	Excess grinding of feed increases digestibility?			
	(a) Yes, (b) No	No	63.33	0.4
14.	Colostrum is fed to animal as because…………….?			
	(a) maintains thirst, (b) acts as a feed, (c) provides immunity, (d) none of the above	Provides immunity	75	0.45
Knowledge on breeding management				
15.	Average gestation period in dairy animal?	280 ± 5 days	78.33	0.5
16.	(a) I should be practiced during			
	(a) Just after signs of heat appears, (b) 10–12 hours after onset of heat, (c) 24 hours after heat d) anytime 10–12 hours after onset of heat	58.33	0.5	
17.	Initial breeding age of exotic animals?			
	(a) 2 months, (b) 18–24 months, (c) 36 months, (d) >36 months	18–24 months	43.33	0.45
18.	Animal comes in heat within …………… days of calving?	45–90 days	36.67	0.4
19.	Crossbred animals in a lifetime produces on an average…………… calves			
	8 calves	33.33	0.45	
20.	Minimum body weight of cross-bred animal during puberty?			
	(a) <200 kg, (b) 250-300 kg, (c) 300-350 kg, (d) >350 kg	250–300 kg	45	0.35
21.	Ideal time of pregnancy diagnosis…………..			
	(a) 1 month, (b) 3 month, (c) 5 month, (d) any time	3 month	48.33	0.4
22.	Average estrus period of dairy animals……………..	18–21 days	36.67	0.5
23.	Ideal dry period in animals?	60 days	35	0.45
24.	Average lactational period in dairy animal…………	300-305 days	40	0.5
Knowledge on housing management				
25.	The orientation of animal shed should be in …………… direction?	East-west	46.67	0.55
26.	Minimum space required for adult dairy cattle…………. (in cm)			
	(a) 30-40, (b) 60-75	60–75	31.67	0.5
27.	In double row system of housing, the animals are tied preferably in			
	(a) Head-head system, (b) Tail-tail system	Tail-tail system	50	0.45
Knowledge on health management				
28.	Symptoms of mastitis………………..	(i) Abnormal color of milk (ii) Teat swollen (iii Hard teat (iv) pus in teat (v) haemolacria etc.	73.33	0.45
29.	Rabies is an infectious disease of dairy animals?			
	(a) Yes, (b) No	No	61.67	0.55
30.	Vaccination against brucellosis should not be done for pregnant animal & breeding bull?			
	(a) Yes, (b) No	Yes	46.67	0.5
31.	Which disease causes maximum mortality in neonatal calf?			
	(a) Calf scour, (b) septicemia, (c) another	Calf scour	65	0.5
32.	Vaccination is a must in dairy animals?			
	a) Yes, b) No	Yes	76.67	0.4
33.	Deworming of animals is not mandatory in dairy management.			
	(a) Yes, (b) No	No	73.33	0.35
34.	When BQ vaccination should be done?			
	(a) Before monsoon, (b) Just after monsoon	before monsoon	70	0.55

Sl. No.	Items	Correct Answer	DI Index	Disc. Index
35.	In which disease proper disposal of animal carcass is very much important?	Anthrax	33.33	0.5
36.	Milk fever occurs due to Sodium deficiency?			
	a) Yes b) No	No	45	0.35
37.	Improper milking method leads to ………….. disease?	Mastitis	80	0.55
Knowledge on General management				
38.	Normal body temperature of cattle…………..			
	(a) 100 ºF, (b) 101.5 ºF, (c) 103 ºF, (d) 105 ºF	101.5°F	38.33	0.4
39.	Dry muzzle is a sign of healthy animal			
	(a) Yes, (b) No	No	70	0.55
40.	The average time taken for calving process is ……………..?			
	(a) 2–3 hours, (b) 4–5 hours, (c) 7–8 hours, (d) 12 hours.	7–8 hours	61.67	0.55
41.	Which system of housing is ideal for scientific housing?			
	(a) Intensive, (b) Semi-intensive, (c) lose housing, (d) None			
	Semi-intensive	35	0.55	
42.	Proper method of milking animals is …………..	Full hand milking	78.33	0.5
43.	Music acts as a stimulus for better milking?			
	(a) Yes, (b) No	Yes	75	0.35
44.	Record keeping is a subsidiary work to dairy management?			
	(a) Yes, (b) No	No	73.33	0.4
Knowledge on calf management				
45.	How much colostrum should be fed to the calf and for how many days?	10–15% of body weight, for first five days	41.67	0.35
46.	Dehorning in calf should be practiced in/after……………….			
	(a) 7-10 days, (b) 1 month, (c) 6 month, (d) 1 year	7–10 days	51.67	0.45
47.	Name some of the methods of identifying animals…………….	Tattooing/ Tagging	56.67	0.45
48.	The right time to wean a calf depends on the condition of the cow and not the age of calf?			
	(a) Yes, (b) No	Yes	65	0.4

0.55 were included in the final format of the knowledge test. Item difficulty index and item discrimination index of all the 87 items were calculated and 48 items which fulfilled both the criteria were selected for the final format of knowledge test in Table 1.

Scoring Method

The summation of scores for correct replies over all the items of a particular respondent indicated his/her level of knowledge about the practices mentioned above. The range of scores was, therefore, from 0 to 48.

Reliability

The reliability of the knowledge test developed was tested in the following two ways.

Split-half method

The split-half method was employed to calculate the reliability coefficient value. All the 48 items of knowledge test were first arranged randomly (simple random sampling) and then divided into two parts. In these two sets, one set having 24 items with odd numbers and other set having 24 items with even numbers were administered to 50 respondents separately. The coefficient of correlation between two sets of scores was computed and the value 0.386 was found to be significant at 1% level. The reliability coefficient, thus obtained, indicated that the internal consistency of the knowledge test developed for the study was quite high.

Test-Retest Method

The knowledge test with 50 items was administered to 25 dairy owners, twice at an interval of 15 days. The coefficient of co-relation value was 0.452, which was found to be significant at 1% level. Hence, the knowledge test constructed was highly stable and dependable for measurement of this variable.

Content Validity of Knowledge Test

The knowledge items in the preliminary test with respect to knowledge about scientific dairy farming were collected from the package of the practices. The care was taken to include items which must cover every major practice of the scientific dairy farming and Items were collected through various sources including experts from the same field; hence it was assumed that the scores obtained by administrating

this test – measured knowledge of the respondents as intended.

CONCLUSION

The application of this test to assess the knowledge level of farmers on scientific dairy farming will give an idea of the existing knowledge level of farmers. Appropriate measures can be taken to improve the knowledge and orientation of farmers towards better farming practices resulting in higher productivity and better profit. Extension functionaries can organize various activities including training programmes to fulfill the knowledge gap. So this knowledge test constructed is highly stable, reliable and content validated for measurement of the level of knowledge of dairy farmers on scientific dairy farming.

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