

# ASSESSING FARMERS' KNOWLEDGE OF SCIENTIFIC DAIRY FARMING PRACTICES FOR TRANSFER OF TECHNOLOGY THROUGH RKVY'S MODERN EXTENSION DELIVERY SYSTEM

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## ABSTRACT

In the realm of agricultural development, the dissemination of scientific knowledge to farmers, particularly in regions with high illiteracy rates and gender-based technology disparities, presents a significant challenge. Addressing this challenge, Sri Venkateswara Veterinary University (SVVU) introduced a groundbreaking extension delivery system in 2017, exemplified by the innovative "*PashuVignana Sanchara Vahini*" mobile vehicle. Through direct village-level engagements, SVVU has empowered farmers with modern agricultural and animal husbandry practices, fostering collaboration and learning within farming communities. Building on this success, an RKVY project expanded the initiative to regional institutions in Andhra Pradesh under SVVU, focusing on localized solutions for farmers' challenges. Recognizing the pivotal role of farmers' knowledge in income generation, this research aimed to develop a knowledge test for dairy farmers to gauge their understanding of scientific dairy practices for the effective application of modern delivery systems. Drawing on established methodologies, a panel of experts constructed a 45-item locally applicable knowledge test, demonstrating high stability and validity. The absence of items on crossbreeds and improved fodder cultivation in the knowledge test is attributed to the region's predominant nondescript dairy breeds and negligible fodder production, exacerbated by the semiarid climate. The test, focusing on scientific dairy animal production, offers a dichotomous assessment of farmers' scientific knowledge, contributing to targeted knowledge transfer strategies and sustainable agricultural development in the regions of the research area.

## INTRODUCTION

While one side of the world is talking about fourth-generation technologies, precision farming (Fontas, 2025), and considering them as game-changing technologies that will revolutionize the way information is disseminated and consumed by farming communities, considering the ground realities of the percentage of illiterate farmers in India, gender-based data on technology consumption and availability of extension delivery system, and the ratio of extension worker to the farmer, it is evident that several inherent factors influence farmers' information seeking behavior (Birner and

Anderson2007), (Gulati,2018).Contemporary agricultural information dissemination underscores the importance of bringing information systems directly to farmers, recognizing the multitude of inherent factors influencing farmers' information-seeking behavior.( Kaegi S. 2015)

With a grassroots approach to scientific outreach, taking the scientific expertise to the farmer's doorsteps,A twofold approach to disseminate scientific knowledge and understand the unique challenges facing farmers in their environments,a first-of-its-kind modern extension delivery system was initiated at Sri Venkateshwara Veterinary University(SVVU) in the year 2017and has been disseminating scientific practices significantly enhancing farmers' knowledge and practices. A mobile Information dissemination vehicle named “PASHU VIGNANA SANCHARA VAHINI’(Mobile Animal husbandrywisdomcarrier)’ was envisioned.Through interactive sessions and demonstrations conducted directly atthe village level, farmers have gained valuable insights into modern agricultural techniques and animal husbandry practices initiated by SVVU. The accessibility of expert guidance and resources delivered right to their doorstep has empowered farmers to make informed decisions and adopt innovative approaches toAnimal Husbandry practices. This initiative has fostered a sense of collaboration and learning within the farming community. By bridging the gap between academia and agriculture, the information dissemination vehicle has become an invaluable tool for driving sustainable development and prosperity among farmers.Expanding this initiative furtherto 2 regional Institutions atGannavaram and Proddatur of Andhra Pradesh an RKVY project titled “ *Transfer of Technology to the farmers and allied sectors through modern extension delivery system*” was initiated. The unique objective was to extend the success and decentralize the facility to create regional impact by addressing local needs and arriving at localized solutions for the regional challenges faced by farmers.

In India Milk production increased from 165.4 to 176.4 million tonnes between 2016-17 and 2017-18, marking a 6.7% growth. This rise in production also led to an enhanced per capita milk availability of 375 grams per day in 2017-18 (NDDDB).Andhra Pradesh ranks first in Sheep and Goat Production and 5<sup>th</sup> in Milk production in India as per DAHD 2012 report.The Proddatur mandal of Kadapa district of Andhra Pradesh is situated in the Rayalaseema regionwhich is classified as the semi-arid region of the Indian sub-continent and receives less than 7mm annual rainfall as per the meteorological report. Animal Husbandry forms a major Income and subsidiary income-generatingactivity for many farmers in Rayalaseema districts.The crucial factor In deciding farmers' income generation, farmers' information needs, and training needs is the knowledge level of the farmer through which She/he is operating the whole income-generating/entrepreneurial setup.The present researchis aimed at developing a knowledge test for Dairy farmers to reach the grassroots and the position of farmers' understanding to estimate the gap for customized knowledge transfer.

## RESEARCH METHODOLOGY

The present methodology of knowledge test on Scientific Dairy practices was developed by using standard methodology. Wang (1932), Thurstone and Chave (1929), Likert (1932), Bird (1940), and Edwards and Kilpatrick (1948) have suggested various informal criteria for editing statements to be used in the construction of attitude scales. Their suggestions are summarized as 14 informal criteria by Edwards(1957), In addition to this Payne (1951) has proposed a checklist while considering single questions for public opinion surveys which is also taken into account and the same has been followed to construct the Knowledge test. A knowledge test to evaluate scientific dairy practices consisting of 85 multiple-choice questions designed by experts based on scientific literature was designed. A panel of experts was contacted through personal communication through scientific networks and 32 judges reviewed the items for relevance, yielding 30 responses. The relevancy score for each item was determined by the summation method. For each item two types of scores were calculated: relevancy weightage (RW) and mean relevancy score (MRS). These scores were derived using specific formulas.

### Relevancy Weightage :

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

$$\text{Relevancy weightage} = \text{Maximum possible score}$$

### Mean Relevancy Score:

$$\frac{(Most\ relevant \times 5) + (Somewhat\ relevant \times 4) + (Relevant \times 3) + (Least\ relevant \times 2) + (Not\ relevant \times 1)}{\text{Number of Judges}}$$

Mean relevancy

Score = Number of Judges

### Item difficulty index

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

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.

### Discrimination index

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

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 flower and lowest scores, respectively.

### Reliability was tested using Cronbach's alpha:

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

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

### Item Content Validity Index (I-CVI)

$$\text{I-CVI (Item-content validity index)} = \frac{\text{Number of agreements per item}}{\text{Number of experts}}$$

### Stability Content Validity Index (S-CVI)

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

Thirty-six dairy farmers from *Sunnapurallapalle* village, an adopted village of the University and designated as a non-sample area for the present research, participated in assessing 85 selected items. The difficulty index (P), calculated as the percentage of respondents providing correct answers to individual items, aimed to filter out extremely difficult or easy items. An optimal difficulty index falls within the 30-70% range, indicating excellent items. Items with P values between 30 to 80 were considered for inclusion in the final knowledge test for Dairy farmers. A higher P-value indicates easier items. Discrimination index values above 0.3 were sought for item selection, aiming to distinguish highly knowledgeable Dairy farmers from less knowledgeable ones. Eventually, 45 items were chosen for the knowledge test, ensuring a differentiation between high and less knowledgeable farmers. The final selection of items was based on the results of difficulty and discrimination indices calculated as per the standard formula. The knowledge test comprised a total of 45 items, as outlined in Table 1. The items/Questions were translated into regional language and administered to the farmers individually.

**Table 1.** Difficulty index, discrimination index, and I-CVI of the knowledge items for Assessing Scientific practices knowledge of Dairy farmers of Kadapa District

SN	Items	Difficulty Index	Discrimination Index	Agreement between experts	I-CVI
1	How should cattle be fed dry and green grass to maximize consumption and digestibility? <b>Chopped / not chopped / none of the above</b>	71.79	0.31	4	0.6667
2	How many hours after birth should a newborn calf be offered colostrum?? <b>Within 1 hour / after 1 hour / can be given at any time</b>	74.36	0.31	5	0.8333
3	What is the typical gestation period for a cow or buffalo? <b>6-7 months / 9-10 months / 12-14 months</b>	92.31	0.46	6	1
4	Animal sheds should be oriented in the following direction for good ventilation: <b>East-west / north-south/south - east / north-west</b>	82.05	0.31	5	0.8333
5	Milking should be completed within <b>1-2 mins / 5-7 mins / 10-12 mins</b>	92.31	0.46	6	1
6	Maximum quantity of green fodder that can be given to a cow is <b>15 - 20 kg / 25 - 30 kg/ 35 - 40 kg</b>	69.23	0.31	5	0.8333

7	What percent of the total cost of milk production is contributed by feed costs? <b>30% / 60 % / 80 %</b>	64.1 0	0.31	4	0.6667
8	Using exotic bull semen for breeding native zebu cows increases milk production <b>Yes / No / I am not aware</b>	66.6 7	0.31	4	0.6667
9	Symptoms you have noticed during heat in cattle <b>Mounting other cows / Bellowing/mucus discharge from vagina / all of these</b>	74.3 6	0.31	5	0.8333
10	When is the best time to artificially inseminate (AI) a cow that is in heat for best results? <b>Start of estrus / Middle of estrus / End of estrus</b>	84.6 2	0.31	5	0.8333
11	Age at sexual maturity in indigenous cows is around <b>12-15 months / 24 months / 30 months</b>	79.4 9	0.46	6	1
12	Wallowing is most essential during summer for <b>Calves / Heifers / Buffaloes</b>	79.4 9	0.46	6	1
13	After parturition, placenta should be expelled completely within <b>24 hours / 48 hours / 72 hours</b>	92.3 1	0.46	6	1
14	How much more concentrate should be given to pregnant cows starting from the seventh month of pregnancy? <b>0.5 kg / 1.5 kg / 3 kg</b>	56.4 1	0.31	4	0.6667

15	The animal house should have proper ventilation for <b>Proper airflow /They are ok in closed environments too/ Animals can survive with insufficient airflow</b>	89.7 4	0.46	5	0.8333
16	Biogas can be produced from <b>Cow urine / Cow dung / Cow milk</b>	92.3 1	0.46	6	1
17	Deworming is essential only in female cattle? <b>Yes / No / Not aware</b>	92.3 1	0.46	6	1
18	For effective drainage, the floor of the standing area in the cow should be Slope/High/Equal level	69.2 3	0.31	6	1
19	After cutting the navel cord, what should be applied to the stump? <b>Cow dung / Antiseptic / Cow milk</b>	92.3 1	0.46	6	1
20	Which milking technique is recommended to ensure udder health? <b>Knuckling / Full hand milking / Stripping</b>	89.7 4	0.46	5	0.8333
21	Regular spraying of ectoparasiticides is needed to <b>Reduce roundworms / reduce flies, lice, ticks / reduce mastitis</b>	92.3 1	0.46	6	1
22	Castration in male calves is done to <b>Improve the horn length / make it docile / for breeding female cows</b>	92.3 1	0.46	6	1



23	NPN compounds can be used for feeding cattle <b>At any age / at calf age only / only after age of 6 months</b>	61.5 4	0.31	5	0.8333
24	High temperature in the cow shed results in <b>Increased milk yield / low milk fat/high milk fat</b>	92.3 1	0.46	6	1
25	The detrimental impact of heat stress on output is lessened when water is sprayed on dairy cows prior to milking. <b>Yes / no / not aware</b>	89.7 4	0.46	5	0.8333
26	Which of the following are more thermo-tolerant? <b>Exotic breeds / Crossbred animals / Indigenous animals</b>	92.3 1	0.46	6	1
27	After how many days of calving does cows can be bred again? <b>30 days / 60 days / immediately after calving</b>	64.1 0	0.31	6	1
28	The optimum calving interval in cattle is <b>1 year / 2 years / 3 years</b>	92.3 1	0.46	6	1
29	Advanced pregnant animals need to be assigned to calving pens in order to <b>Cause abortion / provide the cow and calf greater protection / to create disturbance to other cows</b>	92.3 1	0.46	6	1
30	<b>Can a pregnant cow be milked in last trimester</b> <b>Yes/Not sure/No dry period</b>	92.3 1	0.46	6	1



	<b>is required</b>				
31	Single-row housing is sufficient for how many cows? <b>10-20 cows / 25-30 cows / 35-40 cows</b>	58.9 7	0.31	5	0.8333
32	The recommended daily amount of clean, fresh drinking water for pregnant animals to be given around-the-clock is <b>20-30 litres / 40-50 litres / 70-80 litres</b>	89.7 4	0.46	5	0.8333
33	Which of the following animal diseases can infect humans also? <b>T.B. / Mastitis / FMD</b>	92.3 1	0.46	6	1
34	Common disease seen in calves <b>Mastitis / Brucellosis / Scours</b>	89.7 4	0.46	5	0.8333
35	Carcass of animal affected with which disease should not be opened <b>Brucellosis / FMD / Anthrax</b>	92.3 1	0.46	6	1
36	Muzzle of healthy animals should be <b>Dry / Moist / flaky</b>	89.7 4	0.46	5	0.8333
37	One acre of land is essential for producing fodder required for <b>2 cows / 5 cows / 10 cows</b>	56.4 1	0.31	5	0.8333
38	Vaccination in livestock is done to <b>Reduce population / prevent disease / cause</b>	89.7 4	0.46	5	0.8333

	disease				
39	Calf starter should be fed to calves from _____ age <b>10 days / 30 days / Immediately after birth</b>	51.2 8	0.46	6	1
40	Vaccination should be done by <b>Veterinarian /Any one /Animal Attender</b>	71.7 9	0.38	6	1
41	Debudding can be done at what age in the calf for best results? <b>1-2 weeks / 3-4 weeks / 5-6 weeks</b>	64.1 0	0.46	6	1
42	At breeding, heifers should attain _____ % of their adult body weight <b>25-30 % / 45-50 % / 55-60 %</b>	58.9 7	0.46	6	1
43	After cleaning, milking utensils must be kept <b>In the animal shed / in Sunlight/inside room</b>	79.4 9	0.46	6	1
44	Vaccination against brucellosis should not be used in <b>Heifer Cows / Female calf / Breeding bull</b>	56.4 1	0.31	6	1
45	After milking, the animal shouldn't sit for 30 minutes in order to <b>Increase milk yield / prevent udder contamination / promote udder contamination</b>	74.3 6	0.46	6	1
	S-CVI/Avg				0.9148
	Total agreement				41.167

The CVI/Avg (Content Validity Index/Average) of all the test items being 0.9148 indicates a high level of stability and validity in the constructed knowledge test. This means that the items in the test are deemed highly relevant and appropriate for measuring the scientific dairy practice knowledge levels of dairy farmers. With 45 items in total, the test is designed to be administered in an MCQ format, where respondents undergo an application, recollection, and elimination process before arriving at the correct answer, rather than simply responding to simple dichotomous answers "Yes" or "No" which may lead to mechanical answering to each item. The overall score of an individual on the knowledge level of scientific dairy farming is calculated based on their correct responses, ranging from 0 to 30, providing a comprehensive measure of their understanding of this domain. Methodological constraints in knowledge tests for scientific dairy farming include biases in item selection to achieve balanced responses and maintain farmers' interest to respond, cultural considerations, challenges in standardization of verbal responses to numerical quantification, localized scope, lengthy response format limitations, dialect translation issues, etc. These constraints can impact the validity, reliability, and generalizability of test results, highlighting the need for careful attention to test design, validation procedures, and cultural relevance to ensure the effectiveness of knowledge assessment in scientific dairy farming contexts.

## CONCLUSION

Dairy farmers currently lack sufficient knowledge regarding the effective management of scientific methods of dairy farming. These knowledge gaps pose significant barriers to achieving desired levels of production and productivity. Consequently, understanding the level of knowledge among dairy farmers regarding scientific methods of dairy farming is crucial for developing necessary policies and initiatives to raise awareness as per the objectives of the modern information dissemination system. Therefore, a knowledge test has been developed specifically focusing on scientific methods of dairy farming. This test aims to assess the knowledge levels of dairy farmers, providing a broader picture of the awareness and training programs that need to be tailored to their needs. By providing such programs, farmers can enhance their understanding of scientific methods of dairy farming, ultimately improving their practices and increasing their incomes.

A mobile information dissemination vehicle serves as a crucial tool in narrowing the knowledge gap among dairy farmers regarding scientific methods of dairy farming, particularly in remote and rural areas. By directly reaching out to these communities, the vehicle facilitates access to modern farming practices for geographically isolated farmers. Equipped with multimedia resources and interactive workshops, it enables farmers to engage with experts, enhancing their understanding through hands-on learning experiences. Furthermore, the vehicle can provide real-time updates on best practices and tailored training programs, addressing specific regional needs and fostering community engagement. With sustained visits and ongoing relationships, these vehicles promote

knowledge-sharing and innovation, ultimately improving productivity, profitability, and sustainability within the dairy industry.

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