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Knowledge and adoption of scientific dairy farming practices in operational area of Kisan Sewa Kendra, Muzaffarnagar

¹Anirban Das, ²BS Meena and ³Pawan Singh

¹Research Scholar, Dairy Extension Division, ICAR-National Dairy Research Institute, Karnal, Haryana, India

²Principal Scientist, Dairy Extension Division, ICAR-National Dairy Research Institute, Karnal, Haryana, India

³Principal Scientist, Livestock Production Management Division, ICAR-National Dairy Research Institute, Karnal, Haryana, India

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Corresponding Author: Anirban Das

Abstract

The study evaluated the knowledge and adoption of scientific dairy farming practices among beneficiaries and non-beneficiaries of Kisan Sewa Kendra (KSK) in Muzaffarnagar district of Uttar Pradesh. Using a pre-tested interview schedule, data were collected from 160 dairy farmers (80 beneficiaries and 80 non-beneficiaries). Knowledge and adoption were measured across breeding, feeding, healthcare, and management domains using weighted mean scores. Beneficiaries exhibited significantly higher overall knowledge (85.17%) and adoption (74.89%) compared to non-beneficiaries (69.91% and 59.04%, respectively). Management practices recorded the highest knowledge and adoption levels, while healthcare practices showed comparatively lower adoption. Mann-Whitney U test confirmed statistically significant differences between the two groups for both knowledge and adoption ($p < 0.01$). The findings highlight the effectiveness of KSK as a field-based extension model for promoting scientific dairy farming.

Keywords: Adoption, breeding, extension, mann-whitney, scientific dairy farming

1. Introduction

India, the world's leading milk producer, has made significant strides in recent years due to numerous training programmes, research activities, and the adoption of advanced technologies and scientific dairy farming practices by the farming community. In 2024-25, India's milk production reached 247.87 million tonnes (Mt), marking a 3.58 percent increase from the previous year (BAHS, 2025). Over the past 11 years, India's dairy sector has recorded substantial growth of nearly 70 percent, contributing about 5 percent to the national economy and generating direct employment for more than 8 crore farmers (PIB, 2025a). Milk production, in particular, is one of the pillars of nutritional and livelihood security as the dairy sector directly employs more than 8 crore farmers, and in the process, contributes 5 percent to the national economy (PIB, 2025b). Uttar Pradesh is the top milk-producing state, contributing 15.66 percent to the total national production, which roughly amounts to 39 Mt (BAHS, 2025). The state also houses the highest livestock population in the country, with 67.8 million animals, including 18.8 million cattle and 33 million buffaloes (20th Livestock Census, 2019). Muzaffarnagar, a key agricultural district in Uttar Pradesh, has a significant dairy farming community that plays a vital role in the state's agricultural economy. It was reported to be the second highest district (980 Mt/year) in milk production in Uttar Pradesh, only after Bulandshahar (1285 Mt/year), and more than 70 per cent of its population is

engaged in agriculture (Rajpoot & Singh, 2021) ^[14].

The government has implemented numerous schemes and policies to enhance productivity; however, some have failed, and others have not adequately addressed the existing issues. Tomar *et al.* (2023) ^[17] reported that AI coverage in the country is now restricted to 30 per cent of breedable bovines, with 70 per cent of breedable animals being naturally served mainly by scrub bulls of unknown genetic potential. In order to nullify the drawbacks of previous schemes and provide extension & advisory services to enhance milch animal performance and farmers' income, ICAR-National Dairy Research Institute has launched some projects and initiatives of its own, namely Farmers Field School, Farmers Farm School, Dairy Education At Farmer's Door, Climate Resilient Dairy Farm School, Field Farm Technician Lab, Kisan Sewa Kendra etc. Among these, Kisan Sewa Kendra is a field operational centre constructed in 2005 at Lalukheri, Muzaffarnagar, which started functioning from 2016. It has been playing a crucial role in disseminating scientific dairy farming practices among the dairy farmers of the region by providing four primary interventions, viz.

1. delivery of elite bull semen
2. distribution of fodder crop seeds
3. sale of mineral mixture supplementation, and
4. organizing Kisan Goshti.

Knowledge and adoption are two sides of the same coin. On

one hand, knowledge of scientific dairy farming practices is an essential prerequisite for their adoption, which in turn leads to improved productivity of dairy animals (Chaudhary *et al.*, 2024) ^[5]. On the other hand, adoption of scientific dairy farming practices is widely conceptualized as a knowledge-driven process influenced by farmers' socio-economic characteristics and exposure to extension services. Acharya *et al.* (2022) ^[1] reported that adoption of sustainable dairy management practices among peri-urban dairy farmers varied significantly across different components, with relatively higher adoption of feeding and clean milk production practices and lower adoption of manure and environmental management practices. Similarly, Khurana (2022) ^[9] observed low to medium levels of adoption of improved dairy farming practices in the Kumaon region, despite reasonable awareness among farmers, indicating a persistent gap between knowledge and actual practice. Gender-based studies reveal distinct challenges in the adoption of scientific dairy practices. Thakur *et al.* (2024) ^[16], in an ex post facto study among women dairy farmers in Himachal Pradesh, reported moderate knowledge but low adoption of scientific animal health practices, attributing the gap to limited access to training, institutional services, and decision-making autonomy. Extension interventions have been widely recognized as effective tools for enhancing farmers' knowledge and facilitating adoption. Suresh *et al.* (2023) ^[15] reported a significant increase in the knowledge level of dairy farmers following frontline demonstrations (FLDs) conducted by Krishi Vigyan Kendras (KVKs). Chander & Chand (2022) ^[4] emphasized that adoption of dairy farming practices is a learning-intensive process, wherein repeated exposure and experiential learning contribute to sustained behavioural change. Interestingly, Pouchepparadjou *et al.* (2024) ^[11] established a positive correlation between adoption of scientific dairy farming practices and milk productivity.

Thus, a synthesis of earlier studies across diverse agro-climatic regions of India indicates that while dairy farmers generally possess moderate knowledge of scientific dairy farming practices, adoption remains partial and uneven across different components. Knowledge enhancement through training and extension activities significantly improves adoption potential; however, socio-economic constraints, technological complexity, and limited institutional support often restrict complete adoption (Goswami & Biswas, 2021; Parihar *et al.*, 2020; Chakraborty *et al.*, 2022) ^[8, 10, 3]. Comparative analyses further reveal that beneficiaries of institutional programmes demonstrate superior adoption behaviour compared to non-beneficiaries, highlighting the importance of structured interventions in promoting scientific dairy farming (Chadda *et al.*, 2021) ^[2].

Materials and Methods

The study was conducted in Muzaffarnagar district of Uttar Pradesh, wherein Shahpur and Baghra blocks formed the operational area of Kisan Sewa Kendra. Four adopted villages, viz. Alipur, Bhora Khurd, Lalukheri and Sonjni, and four non-adopted villages, viz. Dholra, Jasoi, Saidpura and Salhakheri were randomly selected. Twenty dairy farmers were randomly selected from each village, thus

making a total of 160 respondents.

Ex-post-facto 'cause-to-effect' research design was adopted for the current study since the manifestations might have already taken place prior to investigation and thus the variables cannot be inherently manipulated. The respondents were divided into two groups, viz. beneficiaries and non-beneficiaries of Kisan Sewa Kendra.

Knowledge is operationalized as the extent of information possessed by the respondents in scientific dairy farming practices, while adoption is operationalized as the decision to apply an innovation or technology in the field of dairy farming and continue to use it. The knowledge test developed by Meena *et al.* (2015) was used for this study. This test consisted of four major domains, viz. breeding practices, feeding practices, healthcare practices, and management practices. The questions asked under each domain was 7, 5, 4 and 10 respectively, thus making a total of 26 questions covering scientific dairy farming practices. A score ranging from 0 to 3 was assigned to each question. The sum of scores received per question under each domain formed the respondent's final raw score. However, since the number of questions asked under each domain was unequal, so the maximum possible score for each domain was also different, viz. 15, 18, 12, and 24 respectively for breeding, feeding, healthcare, and management. Henceforth, the obtained raw scores were then converted to weighted mean scores (WMS), which gave the extent of knowledge or adoption. This facilitated ranking and identification of the areas where knowledge and adoption were higher. Finally, overall knowledge and overall adoption were calculated separately for beneficiaries and non-beneficiaries by taking the geometric mean of the WMSs across the four domains.

$$WMS = \frac{\text{Final raw score of the respondent}}{\text{Maximum possible score in the domain}} \times 100$$

The primary data collected from the respondents were analyzed using various descriptive and inferential statistical techniques like Frequency, Percentage, Arithmetic Mean, Geometric Mean, Standard Deviation, and Mann-Whitney U test. MS-Excel 2021 was used to carry out the preliminary analysis while SPSS IBM-26 and RStudio were used for complex analysis and data visualization.

Results and Discussion

Knowledge of the respondents about scientific dairy farming practices

The data presented in Table 1 provide a detailed comparative analysis of the knowledge levels pertaining to recommended dairy farming practices among beneficiaries and non-beneficiaries. The results clearly indicate that beneficiaries consistently outperformed non-beneficiaries across all four critical domains — breeding, feeding, healthcare, and management — both in terms of raw scores and extent of knowledge expressed as a percentage. Among beneficiaries, the highest WMS was observed in management practices (89.79), followed closely by breeding practices (87.50) and feeding practices (83.89). The least knowledge level was reported in case of healthcare practices (79.67), reflecting weak awareness of disease prevention and animal welfare measures. In contrast, non-beneficiaries demonstrated comparatively modest knowledge levels, with

low WMS recorded for healthcare practices (52.08) followed by breeding practices (58.33). Feeding (66.94) and management practices (72.25) showed decent levels of knowledge, although still inferior to those of the beneficiaries.

The observed differences between the two groups were further substantiated by the results of the Mann-Whitney U test, which is a non-parametric test and it revealed a statistically significant difference in the overall knowledge scores, thereby confirming the superior knowledge acquisition among beneficiaries. This prominent disparity suggests that the intervention was effective in facilitating knowledge transfer, mainly through the provision of high-grade bull semen and fodder crop seeds, training on mineral mixture supplementation, and exposure to extension services like Kisan Goshti. The findings reinforce the importance of structured capacity-building initiatives in improving farmers' technical competencies, which, in turn, can lead to enhanced decision-making, adoption of best practices, and ultimately, improved productivity and sustainability in dairy farming.

Table 1: Knowledge of the respondents in scientific dairy farming

Scientific dairy farming practices	Beneficiaries (n ₁ = 80)		Non-beneficiaries (n ₂ = 80)	
	Raw score	WMS	Raw score	WMS
Breeding	13.125±1.72	87.50	8.75±1.58	58.33
Feeding	15.1±2.43	83.89	12.05±1.67	66.94
Healthcare	9.56±1.56	79.67	6.25±1.61	52.08
Management	21.55±2.32	89.79	17.34±2.23	72.25
Overall knowledge	85.17%		69.91%	
Mann-Whitney U statistic	2464.500			
Z-value	2.718			
p-value	0.007**			

** significant at 1% level of significance

Adoption of scientific dairy farming practices by the respondents

The data in Table 2 present a comparative assessment of the extent of adoption of recommended dairy farming practices between beneficiaries and non-beneficiaries across four key domains — breeding, feeding, healthcare, and management. The results reveal a consistently higher adoption rate among beneficiaries in all categories. Notably, management practices registered the highest WMS among beneficiaries (85.47), followed by feeding (77.56), breeding (69.13), and healthcare (68.67). In contrast, non-beneficiaries recorded markedly lower adoption rates, with healthcare showing the least WMS (49.75), followed by breeding (53.07), feeding (66.94), and management (68.75).

When considered overall, beneficiaries exhibited an average adoption extent of 74.89 percent, significantly higher than the 59.04 percent observed among non-beneficiaries. The Mann-Whitney U test results confirm that this difference is statistically significant at the 1% level of significance (α), indicating that the intervention played a decisive role in enhancing adoption behaviour. These findings underscore the effectiveness of the program in promoting the practical application of improved dairy farming practices, reflecting not only increased exposure to knowledge but also a higher translation of that knowledge into action. Furthermore, this

higher adoption rate among beneficiaries is a strong indicator of the intervention's success in facilitating behavioural change and advancing technology uptake in dairy farming.

Table 2: Adoption of scientific dairy farming practices

Scientific dairy farming practices	Beneficiaries (n1 = 80)		Non-beneficiaries (n2 = 80)	
	Raw score	WMS	Raw score	WMS
Breeding	10.37±2.23	69.13	7.96±1.50	53.07
Feeding	13.96±2.43	77.56	10.30±1.34	66.94
Healthcare	8.24±1.57	68.67	5.97±1.73	49.75
Management	20.51±2.58	85.47	16.50±2.13	68.75
Overall	74.89%		59.04%	
Mann-Whitney U statistic	2250			
Z-value	3.112			
p-value	0.004**			

** significant at 1% level of significance

Conclusion

The study revealed that knowledge and adoption levels were consistently higher among beneficiaries across breeding, feeding, healthcare, and management domains. The higher knowledge, adoption, and productivity levels among beneficiaries indicate that structured interventions like Kisan Sewa Kendra are effective models for improving dairy farming. Strengthening extension services, enhancing training programmes, and improving institutional support are essential for bridging the knowledge–adoption gap. Policymakers and extension agencies should focus on targeted, need-based interventions to promote sustainable adoption of scientific dairy farming practices. Scaling such initiatives to wider areas could enhance technical capacity, adoption of best practices, and farm-level productivity at large.

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