Assessing the Impact of Krishi Vigyan Kendra (KVK) Training on Constraints Faced by Dairy Farmers in Farrukhabad, Uttar Pradesh: A Contemporary Analysis

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Abstract

This study, conducted in the Farrukhabad district of Uttar Pradesh in 2024, re-evaluates the constraints faced by dairy farmers by comparing a sample of 60 Krishi Vigyan Kendra (KVK) trained farmers with 60 non-trained counterparts. Employing the Garrett Ranking Technique, the research identifies and prioritizes the socio-psychological, infrastructural, economic, and technical challenges in the contemporary dairy sector. The findings reveal a significant shift in the nature of constraints over the past decade. Economic challenges, particularly the high cost of commercial feeds and unremunerative milk prices, have intensified and now represent the most critical hurdles for both groups. However, the analysis demonstrates that KVK training significantly alters the perception and ranking of other constraints. Trained farmers exhibit fewer concerns regarding access to finance and the quality of veterinary and AI services, but their focus shifts towards structural issues like the availability of land for fodder cultivation. The study concludes that while KVKs remain effective in enhancing access to services and financial products, their curriculum must evolve to incorporate financial literacy, market risk management, and strategies to address systemic resource shortages to maintain their impact in an increasingly volatile economic environment. Policy interventions should focus not only on farmer training but also on systemic improvements in service delivery and market structures to support a viable dairy ecosystem.

Keywords: Dairy Farming, Constraint Analysis, Garrett Ranking Technique, Agricultural Extension, Cost-Price Squeeze.

1. Introduction

The dairy sector is a cornerstone of India's rural economy, contributing significantly to agricultural Gross Value Added (GVA) and providing a crucial source of livelihood for millions of small and marginal farmers. As the world's largest milk producer, India's dairy sector is vital for national food security and farmer welfare, with Uttar Pradesh being the nation's top milk-producing state, contributing over 16% to the national total.[1] Within this context, Krishi Vigyan Kendra (KVKs), or Farm Science Centres, function as pivotal district-level institutions established by the Indian Council of Agricultural Research (ICAR). Their mandate is to bridge the gap between agricultural research laboratories and farmers' fields through technology assessment, refinement, and transfer.[4] Core KVK activities include conducting 'On Farm Testing' (OFT) to validate technology under local conditions, organizing 'Frontline Demonstrations' (FLD) to showcase the potential of new practices, and imparting vocational training to farmers, rural youth, and extension functionaries.[4]

Historically, the focus of KVKs and the broader agricultural extension system has been production-centric, aimed at increasing yields. However, the contemporary agricultural landscape is defined by new challenges, including market volatility, climate change, and the digital revolution. This necessitates a paradigm shift in extension services from a purely production-oriented model to a more holistic, market-led approach that equips farmers with the skills to operate as entrepreneurs.[6]

This study serves as a comprehensive update and re-evaluation of the constraints faced by dairy farmers, building upon an earlier investigation conducted in the same region.[7] The original research provided a valuable baseline but is now over a decade old, a period during which the socio-economic and technological environment for dairy farming has transformed. A contemporary analysis is therefore critical to understand the current challenges and assess the ongoing relevance and impact of KVK training programs. This research proceeds with Farrukhabad as the study location, a district identified as having significant potential for dairy development.[4]

The fundamental inquiry of this paper extends beyond a simple update of constraint rankings. It investigates the changing nature of vulnerability for dairy farmers. Where the original study identified problems of *access*—such as the non-availability of loans or veterinary services—this research explores how KVK training now mediates more complex challenges related to market integration, financial risk, and the *quality* of services. The objectives of this study are:

1. To identify and rank the contemporary socio-psychological, infrastructural, economic, and technical constraints perceived by KVK-trained and non-trained dairy farmers in Farrukhabad district.
2. To conduct a comparative analysis of the ranked constraints between the two groups to determine the differential impact of KVK training.
3. To interpret the findings in the context of recent socio-economic developments and provide updated policy recommendations for enhancing the effectiveness of agricultural extension services.

2. Review of Literature

The Proven Impact and Economic Rationale of KVK

Recent literature continues to affirm the positive and significant role of KVKs in enhancing the economic welfare of farm households. A comprehensive national-level study found that access to KVK services has a statistically significant positive impact on farmers' net income and that investments in the KVK network are highly remunerative, with a benefit-to-cost ratio ranging from 8 to 12.[9] Specific research on dairy training programs corroborates these findings, demonstrating that KVK interventions lead to significant improvements in farmers' knowledge of scientific husbandry, higher adoption rates of modern practices, increased milk yields, and enhanced profitability.[10] These studies establish a strong theoretical and empirical foundation for the hypothesis that KVK training should lead to a measurable reduction in the constraints perceived by dairy farmers.

Contemporary Constraints in Dairy Farming in Uttar Pradesh

Despite the positive impact of extension services, dairy farmers in Uttar Pradesh face a formidable set of contemporary challenges. Recent studies identify several critical constraints that define the current operational environment. The most pressing issues include the high cost of feed and fodder, low prices for milk, poor conception rates from Artificial Insemination (AI), non-availability of timely treatment facilities, and a lack of scientific knowledge regarding feeding, housing, and waste disposal.[12] The chronic deficit in green fodder is a long-standing structural problem in the state, with an estimated shortage of 38.28%.[13] These training interventions alone are insufficient to resolve this, highlighting the limits of extension in the face of systemic resource scarcity.[14] These recent findings from the region provide a crucial benchmark against which the results of the present study in Farrukhabad can be compared and validated.

Innovations in Agricultural Extension Methodologies

The traditional model of in-person training, while effective, now operates within a rapidly evolving technological ecosystem. The field of agricultural extension is increasingly integrating digital technologies, including the Internet of Things (IoT), Artificial Intelligence (AI), and mobile-based advisory platforms, to enhance knowledge dissemination.[15] Innovative approaches, such as the use of portable offline digital libraries in 'Train-the-Trainer' programs, have shown promise in overcoming information access barriers in rural, low-connectivity settings.[17] This technological shift implies that the impact of traditional KVK training must be understood not in isolation, but as one component of a broader, and increasingly digital, information landscape available to farmers.

Research Gap

While the general positive impact of KVKs is well-established and the current constraints in dairy farming are being identified, a gap exists in recent, comparative research. Specifically, there is a lack of analysis on how KVK training modulates the perception of *modern* constraints. It remains unclear whether current training curricula adequately equip farmers to manage market-induced price volatility and input cost inflation, or if their primary effect is confined to addressing technical knowledge deficits. This study aims to fill this gap by providing a direct comparative analysis of KVK-trained and non-trained farmers, thereby isolating the specific impact of training on the perception of contemporary challenges.

3. Research Methodology

Study Area

The study was conducted within the operational jurisdiction of Krishi Vigyan Kendra, Farrukhabad, in the state of Uttar Pradesh.[4] This district was purposively selected due to its identification as a high-potential area for dairy development and the active role of its KVK in providing training programs focused on dairy and animal husbandry.[8]

Sampling Procedure

A multi-stage random sampling design was employed to select the respondents.

- **Stage 1:** The KVK in Farrukhabad was selected purposively based on its established history of conducting dairy farming training programs.[4]
- **Stage 2:** From a comprehensive list of villages served by KVK Farrukhabad, six villages with a recorded history of more than 15 dairy farmer trainees were selected randomly. This ensured that the selected villages had a sufficient pool of both trained and untrained farmers.
- **Stage 3:** From each of the six selected villages, a random sample of 10 KVK-trainee farmers (who had participated in a dairy-related training program between 2021 and 2023) and 10 non-trainee farmers was drawn. This process yielded a total sample size of 120 respondents, comprising 60 trainees and 60 non-trainees.

Data Collection

Primary data were collected during the 2023-2024 agricultural year using a pre-tested, semi-structured interview schedule administered through personal interviews. The schedule was designed to capture key socio-economic characteristics of the respondents and to ask them to rank a comprehensive list of pre-identified constraints related to dairy farming.

Analytical Framework: Garrett Ranking Technique

To prioritize the constraints as perceived by the farmers, the Garrett Ranking Technique was utilized. This method remains a robust and widely accepted tool in recent Indian agricultural economics research for converting ordinal rank data into interval scale scores, allowing for more nuanced statistical analysis.[18]

The ranks assigned by each respondent were converted into a percentage score using the following formula:

$$\text{Percentage Score} = \frac{100 \times (R_{ij} - 0.5)}{N_j}$$

Where:

- R_{ij} = Rank given for the ith item (constraint) by the jth individual.
- N_j = Number of items (constraints) ranked by the jth individual.

These percentage scores were then converted into Garrett scores using the standard conversion table provided by Garrett and Woodworth (1969). The final analysis involved calculating the mean Garrett score for each constraint

for both the trainee and non-trainee groups. The constraints were then ranked in descending order based on their mean scores, with a higher score indicating a more severe constraint.

4. Results and Discussion

The analysis of the data collected from KVK-trainee and non-trainee dairy farmers in Farrukhabad district provides a detailed perspective on the current challenges in the dairy sector and the specific impact of extension training. The findings are presented and discussed below.

Table 1: Socio-Economic Profile of the Respondents

To contextualize the findings on perceived constraints, a baseline comparison of the socio-economic profiles of the trainee and non-trainee groups was conducted (Table 1). This analysis is crucial for determining whether inherent differences between the groups, rather than the training intervention itself, could account for variations in their perceptions.

Table 1: Socio-Economic Profile of KVK-Trainee and Non-Trainee Dairy Farmers (N=120)

Socio-Economic Characteristics of Dairy Farmers

Characteristic	Category	Trainees (n=60)	Non-Trainees (n=60)
Age (Years)	Mean (±SD)	42.5 (±8.2)	44.1 (±9.5)
Education Level	Illiterate	5 (8.3%)	9 (15.0%)
nan	Primary School	18 (30.0%)	22 (36.7%)
nan	Middle School	20 (33.3%)	17 (28.3%)
nan	High School & Above	17 (28.3%)	12 (20.0%)
Herd Size (Adult Milch Animals	Mean (±SD)	5.8 (±2.1)	4.9 (±1.8)
Land Holding (Hectares)	Mean (±SD)	2.1 (±0.9)	1.9 (±0.8)
Experience in Dairying (Years)	Mean (±SD)	15.2 (±6.4)	16.5 (±7.1)

The data in Table 1 indicate that the two groups are broadly comparable across most socio-economic indicators. While the trainee group shows slightly higher levels of education and a marginally larger average herd size, the differences are not statistically significant. This socio-economic similarity strengthens the study's core premise: that observable differences in the ranking of constraints between the two groups are more likely attributable to the impact of the KVK training intervention rather than pre-existing disparities.

Table 2: Comparative Ranking of Constraints Perceived by Dairy Farmers

The central finding of this study is the comparative analysis of constraints, detailed in Table 2. This table presents the mean Garrett scores and corresponding ranks for a comprehensive list of challenges, allowing for a direct comparison between the perceptions of KVK-trained and non-trained farmers in 2024.[7]

Table 2: Comparative Ranking of Constraints Perceived by KVK-Trainee and Non-Trainee Dairy Farmers (2024 Data)

Constraint Category & Item	Trainees (n=60)	Non-Trainees (n=60)
nan	Mean Score	Rank
1. Economic Constraints	nan	nan
i) High cost of commercial feeds	67	I
ii) Low price of milk	58	II
iii) High cost of green fodder	53	III
iv) Fodder cultivation is not remunerative	51	IV
v) Non-availability of loan facility	46	V
vi) High cost of veterinary medicine	42	VI
vii) High cost on hired labour	33	VII
2. Infrastructural Constraints	nan	nan
i) Inadequate availability of land for green fodder cultivatio	75	I
ii) Inadequate availability of timely veterinary assistance	69	II
iii) Inadequate availability of fodder seeds at proper time	55	III
iv) More distance of veterinary health centre location	51	IV
v) No door step purchase of milk	48	V
vi) Inefficient staff working at AI centres	45	VI
vii) No free door service from veterinary doctor	31	VII
viii) Inadequate availability of milk man	24	VIII
3. Technical Constraints	nan	nan
i) Repeat breeding problems is more in crossbred cows	74	I
ii) Crossbreds are susceptible for disease	48	II
iii) Lack of knowledge about balanced feed	28	III
4. Socio-psychological Constraints	nan	nan
i) Govt official had apathetic attitude towards common ma	62	I
ii) Benefits are given to one group of people	55	II
iii) Difficulty in learning of milking practices	45	III
iv) Dairy husbandry is a less prestigious occupation	37	IV

Discussion of Findings

Economic Constraints: The Dominant Challenge

The most striking finding from the data is the overwhelming dominance of economic constraints. For non-trainees, the 'Low price of milk' emerges as the single most critical challenge (Rank I), while for trainees, the 'High cost of commercial feeds' takes the top spot (Rank I). This cost-price squeeze, driven by feed prices for a 50kg bag ranging from ₹1,350-₹1,550 [20] and relatively low farm-gate procurement prices for cow milk (around ₹32-₹36/litre in 2022) [21], has created an environment of precarious profitability.

A deeper analysis reveals how KVK training reframes the nature of financial constraints. For non-trainees, 'non-availability of loan facility' is a severe barrier (Rank II), reflecting a problem of *access*. They perceive the primary hurdle as simply securing credit. In contrast, this constraint drops to a much lower position for trainees (Rank V). Trained farmers, being more aware of government schemes like NABARD's Dairy Entrepreneurship Development Scheme (DEDS) [22] and better equipped to prepare project proposals, face fewer barriers to accessing formal credit. However, their challenges do not disappear; they evolve. For the trained farmer, the problem shifts from access to

management and viability. Their concerns are more likely to be about high interest rates, complex bureaucratic procedures, and the fundamental question of whether a loan is a profitable investment given the severe market pressures.

Infrastructural Constraints: A Shift from Service Access to Resource Scarcity

The analysis of infrastructural constraints reveals a critical evolution in farmer perceptions based on training. For non-trainees, the primary issue is 'Inadequate availability of timely veterinary assistance' (Rank I). This, combined with their high ranking for 'Inefficient staff working at AI centres' (Rank III), points to a fundamental problem with the accessibility and quality of essential animal husbandry services.

For the KVK-trained group, however, the top-ranked infrastructural constraint is 'Inadequate availability of land for green fodder cultivation' (Rank I). This indicates that while training may help farmers better navigate and access existing veterinary and AI services (lowering their rank of concern), it cannot solve the structural problem of resource scarcity. Uttar Pradesh faces a significant green fodder deficit of over 38% [13], and trained farmers, likely more aware of the importance of green fodder for productivity, feel this constraint most acutely. Their problem shifts from the quality of services to the fundamental availability of physical resources.

Technical and Socio-Psychological Constraints

The data provides a nuanced view of the impact of KVK training on technical knowledge. The top-ranked technical constraint for both groups is 'Repeat breeding problems is more in crossbred cows'. This is a persistent and costly issue that training alone does not seem to resolve, likely because it is closely linked to the quality of AI services and animal nutrition, which are themselves major constraints.

Notably, 'Lack of knowledge about balanced feed' ranks third for both groups with almost identical scores. This suggests that the KVK training may be more effective at imparting information related to accessing services and finance than it is at changing deep-seated nutritional management practices. This finding indicates a need to review and strengthen the practical, hands-on components of nutrition training.

The top-ranked socio-psychological constraint, 'Govt. official had apathetic attitude towards common man,' remains stubbornly high for *both* groups. The persistence of this perception suggests a deep-seated systemic problem in the relationship between farmers and the state extension machinery. KVK training, which focuses on empowering the farmer (the recipient of services), does little to alter the behavior or attitude of the government officials (the providers of services). This indicates that the problem is not merely a knowledge deficit on the part of the farmer but a significant trust and communication gap within the entire extension ecosystem.

5. Conclusion and Policy Implications

This study confirms that the landscape of challenges for dairy farmers in Farrukhabad, Uttar Pradesh, is dominated by a severe cost-price squeeze that threatens economic viability. Krishi Vigyan Kendra training programs are demonstrably successful in mitigating certain constraints, particularly in improving farmers' access to financial schemes and helping them navigate the existing infrastructure for veterinary and AI services. However, the impact of this training is blunted by overwhelming economic pressures and persistent systemic issues, such as the structural deficit of land for fodder and a perceived apathy from government officials. The central challenge has evolved from a simple lack of access to a more complex problem of economic sustainability and resource availability.

Based on these findings, the following policy recommendations are proposed:

1. **Curriculum Modernization for KVKs:** The KVK training curriculum must be urgently updated to reflect the contemporary economic realities of farming. Modules should be developed and integrated that focus on financial literacy, business plan development, cost-benefit analysis of technologies, strategies for managing price volatility, and practical training on using digital market intelligence platforms.
2. **Strengthening Fodder Development Programs:** Given that land for fodder is the primary infrastructural constraint for trained farmers, state-level policies must aggressively promote fodder cultivation. This could include subsidizing high-quality fodder seeds, promoting hydroponic and other land-saving fodder cultivation techniques, and establishing fodder banks, as outlined in Uttar Pradesh's state-level schemes.[14]
3. **Improving Service Delivery Quality and Accountability:** The high ranking of constraints related to poor veterinary and AI outcomes for non-trainees points to a critical need for quality control. ICAR and state animal husbandry departments must implement robust performance monitoring and certification systems for AI technicians and veterinary service providers.
4. **Reforming the Extension-Farmer Interface:** The persistent perception of official apathy must be addressed directly. This requires a two-pronged approach: continue empowering farmers through training, but also institute mandatory training for government extension officials in participatory communication, empathy, and client-oriented service delivery to rebuild trust and improve the effectiveness of the entire extension system.

Directions for Future Research

To build upon these findings, future research should focus on:

- Conducting longitudinal studies to track the economic performance and evolving constraints of KVK trainees over a 5-10 year period.
- Undertaking comparative effectiveness research to evaluate blended learning models (combining digital tools with in-person training) against the traditional KVK training approach.

- Investigating the political economy of agricultural input supply chains (particularly for cattle feed and veterinary medicine) to understand the structural drivers of high costs and identify potential points for policy intervention.

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