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Constraint analysis of dairy farming in tribal areas through descriptive statistics and non-parametric ranking techniques

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Abstract

The present study was conducted to identify the constraints faced by dairy farmers in the adoption of improved animal husbandry practices in the tribal-dominated Chhotaudepur district of Gujarat. A total of 210 dairy farmers were selected randomly from 30 villages across Bodeli, Sankheda, and Pavi Jetpur talukas. Data were collected using a structured interview schedule, and constraints were measured on a three-point continuum scale. The collected data were analysed using descriptive statistics, Friedman test, Kendall's coefficient of concordance, and ranking techniques. The findings revealed that low price of milk (2.59), high cost of animals and production inputs (2.53), and high feed and labour costs (2.42) were the most severe constraints perceived by dairy farmers. Among the major categories, financial constraints ranked first (Mean rank = 6.60), followed by marketing and management constraints. The Friedman test indicated significant differences among constraint categories ($\chi^2 = 351.510$, $p < 0.001$), while Kendall's W (0.239) showed low to moderate agreement among respondents. The study highlights the need for policy interventions related to remunerative milk pricing, simplified loan procedures, improved veterinary and extension services, and farmer training programs to enhance the sustainability and profitability of dairy farming.

Keywords: Constraints, dairy farming, non-parametric tests, Friedman test, radar chart

1. Introduction

The livestock sector plays a significant role in Indian agriculture and allied activities, contributing substantially to rural livelihoods and the national economy. With the changing global scenario, there is an increasing need to educate dairy farmers about scientific dairy management practices, including clean milk production, processing, preservation, storage, and transportation of milk and milk products. However, several constraints continue to hinder the adoption of improved dairy practices. Major challenges identified include inadequate knowledge of scientific dairy animal management, lack of awareness regarding balanced feeding, poor availability of quality feed and fodder, shortage of high genetic merit indigenous bulls, low conception rates through artificial insemination, and insufficient veterinary services (Gamit *et al.*, 2021) [3]. Similar factors contributing to the discontinuance of adaptation strategies were also reported by Ghasura *et al.* (2024) [4]. Chinchmalatpure (2022) [2] observed that dairy farmers faced several difficulties in adopting improved dairy management practices for quality milk production. The major constraints included inadequate veterinary services in villages, high costs of feed and fodder, lack of financial resources to invest in dairy enterprises, year-round scarcity of green fodder. The study further highlighted that most farmers expressed the need for training programs on

improved dairy farming practices and suggested that cooperative societies should provide more remunerative prices for milk and milk products.

Similarly, Ashwar and Vekariya (2023) [1] reported that the high cost of concentrate feed and feed ingredients was the most serious constraint faced by dairy farmers. Other major problems included non-remunerative milk prices, poor availability and high cost of dry fodder during the monsoon season, inadequate supply of green fodder throughout the year, reproductive disorders in animals.

In addition, Pandey *et al.* (2024) [7] reported that healthcare practices were less widely adopted compared to other dairy management dimensions. The authors stressed the importance of organizing demonstrations and training programs on animal healthcare practices to improve disease management and maintain better animal health among dairy farmers. In light of the above challenges, the present study was undertaken to examine the constraints faced by dairy farmers, particularly in tribal areas, in order to understand the ground realities and provide insights for policymakers to formulate appropriate measures for making dairy farming more sustainable and profitable.

Objectives

To study the constraints of dairy farmers in adoption of improved animal husbandry practices

Methodology

The study was conducted in Chhotaudepur district, which was purposively selected for the investigation due to its predominantly tribal population. A total of 30 villages were selected from three talukas, namely Bodeli, Sankheda, and Pavi Jetpur. From each selected village, seven dairy farmers were randomly chosen, resulting in a total sample size of 210 respondents. Data were collected using a structured questionnaire specifically designed for the study. The constraints faced by dairy farmers were assessed using a three-point continuum scale, where a score of 3 indicated “most serious,” 2 indicated “serious,” and 1 indicated “least

serious.”

The collected data were analysed using appropriate statistical tools, including descriptive statistics such as mean and standard deviation, along with the Friedman test, Kendall’s coefficient of concordance (Kendall’s W), and ranking methods for prioritization of constraints.

Results and Discussion

Constraints Faced by Dairy Farmers

The mean scores of different constraints perceived by dairy farmers were calculated based on respondents’ ratings and are presented in Table 1 in descending order of severity.

Table 1: Mean scores of constraints perceived by dairy farmers

Sr. No.	Constraints	Mean score
1.	Low price of milk	2.59
2.	High cost of animals and inputs	2.53
3.	High cost of feed, labour	2.42
4.	Cumbersome loan procedures & paperwork	2.18
5.	Poor conception rate / repeat breeding problems	2.07
6.	Difficulty in getting loans/financial support	2.06
7.	Poor sanitation and hygiene in sheds	2.02
8.	High cost or lack of proper animal housing	1.92
9.	Lack of labour/time for proper management	1.87
10.	Delay or irregular payment	1.85
11.	Unavailability of green fodder round the year	1.82
12.	Unavailability of timely AI and veterinary services	1.81
13.	High cost of veterinary medicines/treatment	1.79
14.	Lack of knowledge on heat detection / silent heat	1.75
15.	Difficulty in getting emergency veterinary services	1.73
16.	Lack of knowledge on balanced feeding	1.72
17.	Lack of knowledge about schemes and support	1.64
18.	Distant location of veterinary clinic	1.63
19.	Lack of fodder cultivation resources (land/water/seed)	1.58
20.	Lack of nearby training facilities(dairy/organic/health)	1.57
21.	Lack of proper market or collection facility	1.54
22.	Poor transport and village infrastructure	1.50
23.	Fear of risk/failure in dairy farming	1.48
24.	Lack of family or social support	1.25

Table 1 revealed that the low price of milk was perceived as the most severe constraint, with the highest mean score (2.59), followed by the high cost of animals and other production inputs (2.53). High feed and labour costs also emerged as major constraints with a mean score of 2.42. The respondents reported that they sold their milk to Baroda Dairy and experienced fluctuations in milk prices. Financial and economic issues were therefore identified as the predominant challenges affecting dairy farming in the study area.

Other important constraints included cumbersome loan procedures and paperwork (2.18), poor conception rate and repeat breeding problems (2.07), and difficulty in obtaining loans and financial support (2.06). Constraints related to

veterinary services, feeding management, and infrastructure showed comparatively moderate severity levels. The least severe constraint perceived by respondents was lack of family or social support, with a mean score of 1.25.

The findings indicate that economic and financial limitations considerably influence the sustainability and profitability of dairy farming activities. Similar findings have been reported in previous dairy farming studies where rising input costs and low milk prices were identified as major concerns among farmers (Chinchmalatpure, 2022; Ashwar and Vekariya, 2023) ^[2, 1]. Fig. 1 illustrates the relative severity of different constraints through a horizontal bar chart for better visual interpretation.

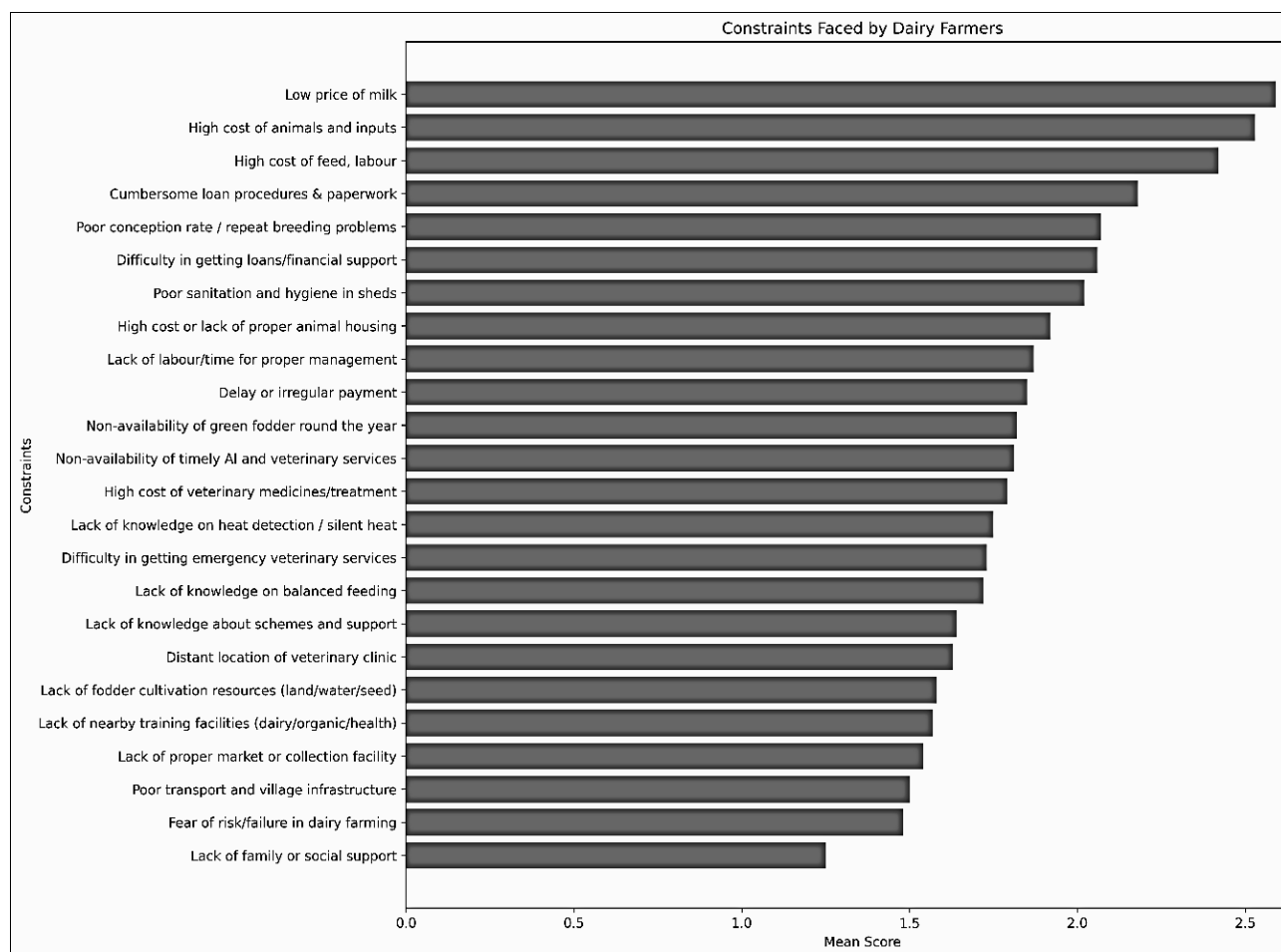


Fig 1: Horizontal bar chart showing constraints faced by dairy farmers

Group-wise Descriptive Statistics of Constraints

The 24 identified constraints were grouped into eight major categories, namely breeding, feeding, management, health, financial, marketing, infrastructural, and socio-personal

constraints. The descriptive statistics, including mean, standard deviation, mean rank, and overall ranks, are presented in Table 2.

Table 2: Descriptive statistics of different categories of constraints

Sr. No.	Category wise constraints	Mean Score	Std. Deviation	Mean Rank (Friedman test)	Rank
1	Breeding constraints	1.88	0.47	4.74	IV
2	Feeding constraints	1.71	0.45	3.96	VI
3	Management constraints	1.93	0.58	4.85	III
4	Health constraints	1.72	0.60	4.08	V
5	Financial constraints	2.29	0.56	6.60	I
6	Marketing constraints	1.99	0.40	5.41	II
7	Infrastructural constraints	1.54	0.50	3.45	VII
8	Socio personal constraints	1.46	0.38	2.92	VIII

Table 2 indicates that financial constraints ranked first with the highest mean rank (6.60), showing that respondents perceived financial issues as the most severe category of constraints. Marketing constraints ranked second (5.41), followed by management constraints (4.85) and breeding constraints (4.74). Health and feeding constraints occupied intermediate positions, whereas infrastructural and socio-personal constraints were perceived as comparatively less severe.

Socio-personal constraints obtained the lowest mean rank (2.92), indicating that personal and social factors were perceived as less severe compared to economic and management-related issues influencing dairy farming and

entrepreneurial behaviour among respondents. The higher ranking of financial constraints may be attributed to rising input costs, inadequate awareness about government provisions, and low profitability in dairy farming. Similarly, marketing-related challenges such as low milk prices and irregular payments significantly affected farmers economic stability. Raj *et al.* (2025) ^[8] reported that breeding constraints were the most serious challenge faced by Scheduled Caste dairy farmers, mainly due to insufficient knowledge of heat detection. Feeding constraints ranked second because of the high cost of feed and limited availability of fodder, followed by healthcare and marketing constraints.

Visual representation of Constraint Dimensions

A radar chart was employed to illustrate the mean scores of the major constraint categories, which clearly indicated that financial constraints constituted the most severe dimension among all categories. In contrast, socio-personal constraints exhibited the lowest severity. The graphical representation provides a comprehensive overview of the multidimensional nature of challenges experienced by dairy farmers. Fig. 2 presents a radar chart depicting the severity levels of different categories of constraints faced by dairy farmers.

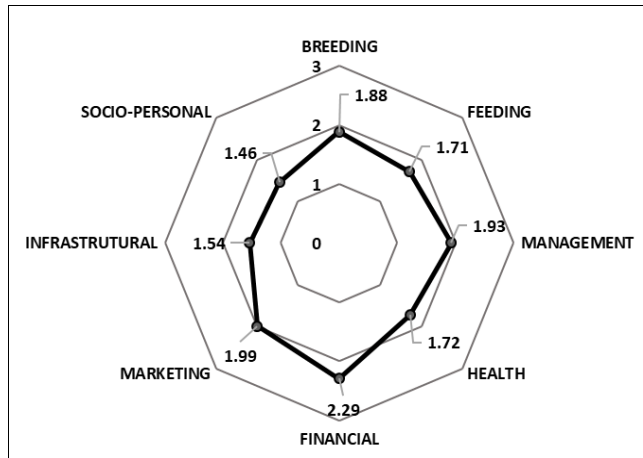


Fig 2: Radar chart showing different dimensions of constraints faced by dairy farmers

Friedman Test and Kendall’s Coefficient of Concordance

The Friedman test was performed to determine whether significant differences existed among the eight categories of constraints perceived by dairy farmers. The test results are presented below.

Test Statistics	
N	210
Kendall's W	0.239
Chi-Square value (χ^2)	351.510
Degrees of freedom (df)	7
Asymptotic significance (p-value)	0.000

The Friedman test revealed statistically significant differences among the eight categories of constraints ($\chi^2 = 351.510, p < 0.001$), indicating that dairy farmers perceived varying levels of severity across different constraint dimensions. Similar findings were reported by Naik *et al.* (2026) [6], who observed a strong and statistically significant agreement among respondents, with a p-value of 0.000 indicating that the agreement was highly unlikely to have occurred by chance. Kendall’s coefficient of concordance ($W = 0.239$) indicated a low to moderate level of agreement among respondents regarding the ranking of constraints. This suggests considerable variability in farmers’ perceptions, possibly due to differences in socio-economic status, resource availability, possession of milch animals, frequency of extension agency contact and mass media participation.

Conclusion

The study identified several constraints affecting dairy

farmers, with financial and marketing-related issues emerging as the most severe. Low milk prices, high input costs, and limited financial support were the major challenges perceived by respondents. The Friedman test confirmed significant differences in the severity levels of various constraint categories, while Kendall’s coefficient of concordance indicated low to moderate agreement among farmers. The findings suggest the need for policy interventions aimed at improving milk pricing mechanisms, simplifying loan procedures, creating awareness about government provisions, strengthening veterinary and extension services, conduct trainings and capacity building programs. Addressing these constraints could contribute significantly to improving the profitability and sustainability of dairy farming in the study area.

Implications

- The findings of the study provide valuable insights into the various constraints affecting the adoption of improved animal husbandry practices and the entrepreneurial behaviour of dairy farmers in the study area.
- The findings imply that cooperative societies need to offer more remunerative prices for milk and milk products to improve the economic condition and sustainability of dairy farming among farmers.
- The study highlights the need for targeted policy interventions, training programmes, and awareness campaigns by the government and extension agencies to address financial, management, and marketing-related constraints, thereby improving the profitability and sustainability of dairy farming in such regions.

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Conflict of Interest

No conflict of interest among researchers.

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