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Adoption behaviour towards scientific feeding practices among dairy farmers in Anand district of Gujarat state

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ABSTRACT

The present study was conducted to assess the nutritional status and feeding practices of high-yielding dairy cattle in Anand district of Gujarat, with particular emphasis on farmers' socio-economic characteristics, knowledge, attitude, adoption of scientific feeding practices, and constraints encountered in nutritional management. An ex-post facto research design was employed, and data were collected from 150 dairy farmers selected through a multi-stage random sampling procedure using a structured interview schedule in the local Gujarati language. The findings revealed that the majority of respondents were middle-aged (56.0%), male (88.7%), had medium levels of extension participation (56.0%), medium mass media exposure (70.0%) and medium innovativeness (61.3%). A predominant proportion of farmers (44.7%) had a medium level of adoption of recommended scientific feeding practices. Correlation analysis revealed that adoption was positively and significantly associated with education ($r = 0.189$), herd size ($r = 0.268$), annual income ($r = 0.203$), extension training ($r = 0.252$), mass media exposure ($r = 0.213$), innovativeness ($r = 0.355$), knowledge ($r = 0.272$) and attitude ($r = 0.169$). Age ($r = -0.167$) and dairy farming experience ($r = -0.160$) showed significant negative relationships with adoption, while gender, family size and land holding showed non-significant relationships. Among the major constraints, high cost of concentrate feed, lack of knowledge about balanced ration, lack of availability of improved fodder varieties, and limited land availability for fodder cultivation ranked highest. The study highlights the need for targeted extension interventions, scientific feeding education, balanced-ration training, and improved access to affordable quality feed and fodder resources to enhance nutritional management, productivity and profitability of high-yielding dairy cattle in Anand district.

Keywords: Balanced ration, Concentrate, Production, Roughages, Scientific feeding

1. Introduction

India is the world's largest milk-producing country and dairy farming is an important source of livelihood and income for millions of rural households. However, dairy productivity is influenced considerably by the availability, quality and efficient utilization of feed and fodder resources. Feed scarcity has been identified as one of the major constraints responsible for economic losses in Indian dairy production (Birtal *et al.*, 2005) [1], while animal productivity also varies with management and production conditions (Al Kalaladeh *et al.*, 2021) [2].

Gujarat has a well-developed cooperative dairy system and occupies an important position in India's dairy sector. Nevertheless, studies conducted in different districts have reported several deficiencies in scientific feeding management (Kale *et al.*, 2016) [3]. Farmers commonly depend on stall feeding, locally available green and dry fodder, and concentrate feeding based largely on milk production, while practices such as scientific ration formulation and systematic fodder management are not uniformly adopted (Jadav *et al.*, 2014) [4].

Feed cost, non-availability of green fodder throughout the year, inadequate knowledge of balanced ration formulation, lack of awareness about straw treatment and insufficient knowledge of silage preparation are among the major constraints reported among dairy farmers in Gujarat (Patel *et al.*, 2019) [5]. Fodder production itself is also affected by inadequate credit facilities, limited training and on-farm demonstrations, and other resource constraints, particularly in North Gujarat (Pawar *et al.*, 2019) [6]. Improved feeding and fodder-resource management are therefore essential for enhancing dairy productivity, reducing feed wastage and improving farm profitability. Extension services, farmer training, balanced-ration awareness, improved fodder production, conservation technologies and appropriate supplementation can play an important role in addressing these constraints (Rathva *et al.*, 2019) [7]. Therefore, understanding existing feeding practices, fodder-resource management, and constraints faced by dairy farmers is essential for developing location-specific strategies for sustainable dairy development in Gujarat.

2. Objectives

1. To assess the socio-economic profile of dairy farmers and its relationship with the adoption of scientific feeding practices among high-yielding dairy cattle.
2. To identify and rank the major constraints faced by dairy farmers in adopting scientific feeding practices.

3. Material & Methods

An ex-post facto research design was employed for the study in Anand district of Gujarat. A total of 150 dairy farmers were selected through multistage random sampling from five talukas, namely Borsad, Khambhat, Tarapur, Anklav and Anand, with three villages selected from each taluka and ten dairy farmers from each selected village. Data were collected using a structured interview schedule in the Gujarati language. The collected data were analysed using SPSS software using frequency, percentage, mean, standard deviation, correlation coefficient and Response Priority Index (RPI) for ranking the major constraints.

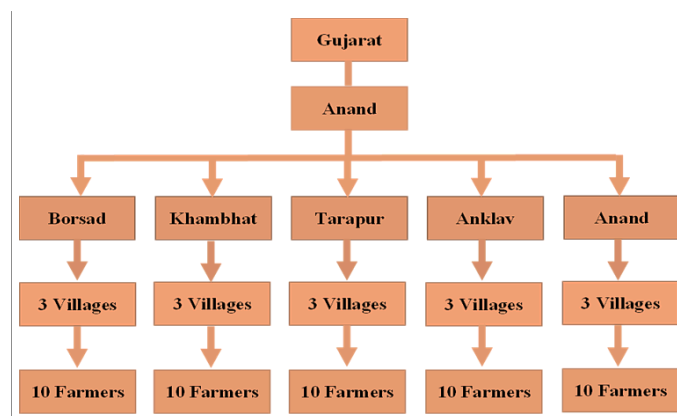
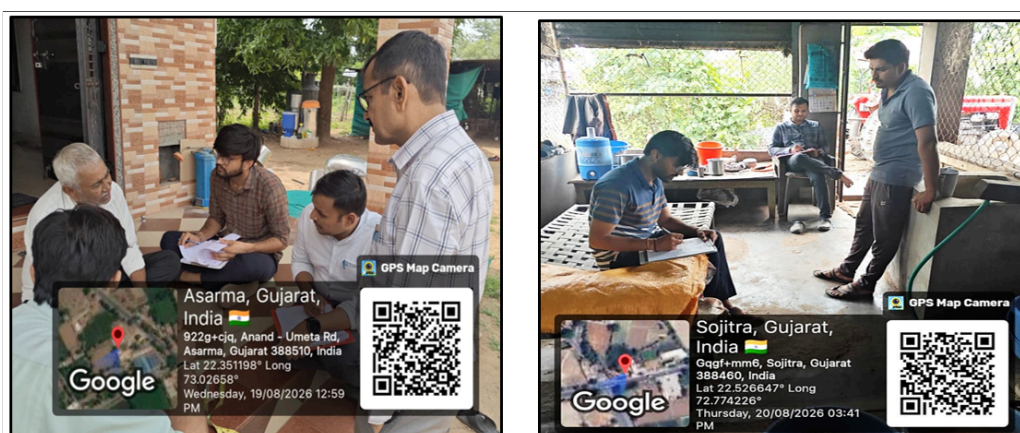


Figure 1. Multistage Random Sampling



4. Results & Discussion

Table 1. Distribution of dairy farmers according to their selected characteristics (n = 150)

Sr. No.	Characteristics	Frequency	Percentage (%)
Age			
1	Young age (up to 35 years)	29	19.33
2	Middle age (36 to 50 years)	84	56.00
3	Old age (above 50 years)	37	24.67
Education Level			
1	Illiterate	07	4.67
2	Primary (up to 8 th std.)	30	20.00
3	Secondary (9 th to 10 th std.)	47	31.33
4	Higher Secondary (11 th to 12 th std.)	45	30.00
5	Graduate	18	12.00
6	Post graduate	03	2.00
Family Size			
1	Small (up to 4 members)	81	54.00
2	Medium (5 to 8 members)	64	42.67
3	Large (above 8 members)	05	3.33
Field Experience			
1	Very low (up to 5 years)	20	13.33
2	Low (6 to 10 years)	48	32.00
3	Medium (11 to 15 years)	50	33.33
4	High (16 to 20 years)	21	14.00
5	Very high (above 20 years)	11	7.33
Herd Size			

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Sr. No.	Characteristics	Frequency	Percentage (%)
1	Small (up to 5)	58	38.66
2	Medium (6 to 10)	72	48.00
3	Large (above 10)	20	13.33
Land Holding			
1	Landless	07	4.67
2	Marginal (below 1.0 ha)	08	5.33
3	Small (1.0 to 2.0 ha)	33	22.00
4	Semi medium (2.0 to 4.0 ha)	45	30.00
5	Medium (4.0 – 10.0 ha)	47	31.33
6	Large (Above 10.0 ha)	10	6.67
Annual Income			
1	Very low (Below 1.5 lacs)	06	4.00
2	Low (up to 3 lacs)	68	45.33
3	Medium (up to 4.5 lacs)	46	30.67
4	High (up to 6 lacs)	23	15.33
5	Very high (Above 6 lacs)	07	4.67
Extension Participation			
1	Very low Participation	00	0.00
2	Low Participation	25	16.67
3	Medium Participation	84	56.00
4	High Participation	37	24.67
5	Very high Participation	04	2.67
Mass Media Exposure			
1	Very low Exposure	02	1.33
2	Low Exposure	24	16.00
3	Medium Exposure	105	70.00
4	High Exposure	19	12.67
5	Very high Exposure	00	0.00
Innovativeness			
1	Low	38	25.33
2	Medium	92	61.33
3	High	20	13.33
Knowledge			
1	Very low	03	2.00
2	Low	15	10.00
3	Medium	54	36.00
4	High	69	46.00
5	Very high	09	6.00

The socio-economic profile of the respondents revealed that the majority of dairy farmers (56.00%) belonged to the middle-age group (36-50 years), followed by old (24.67%) and young (19.33%) farmers. A large majority were male (88.67%), while 11.33% were female. Regarding education, the highest proportion had secondary education (31.33%), followed by higher secondary (30.00%) and primary education (20.00%), indicating a moderate educational background among respondents. In terms of family size, 54.00% had small families, while 42.67% had medium-sized families. Dairy farming experience was predominantly medium (33.33%) and low (32.00%). With respect to landholding, the largest proportion possessed medium landholdings (31.33%), followed by semi-medium holdings (30.00%). Nearly half of the respondents (45.33%) belonged to the low annual-income category. Extension participation was predominantly medium

(56.00%), while 70.00% had medium mass-media exposure. Similarly, most respondents (61.33%) exhibited medium innovativeness, whereas knowledge regarding scientific feeding practices was predominantly high (46.00%), followed by medium (36.00%). The overall profile suggests that the respondents were predominantly middle-aged male dairy farmers with moderate levels of education, extension participation, mass-media exposure and innovativeness. Similar relationships between farmers' socio-economic characteristics, knowledge, extension exposure and adoption of scientific dairy practices have been reported by Sabapara *et al.* (2010) [8]. The present study also found significant associations of education, herd size, annual income, extension training, mass-media exposure, innovativeness, knowledge and attitude with adoption of scientific feeding practices.

Table 2. Coefficient of Correlation of selected characteristics of dairy farmers with their adoption of scientific feeding practices

Sr. No.	Characteristics	Coefficient correlation (r)
X ₁	Age	-0.167*

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Sr. No.	Characteristics	Coefficient correlation (r)
X ₂	Gender	0.056 ^{NS}
X ₃	Education level	0.189**
X ₄	Family size	0.038 ^{NS}
X ₅	Experience in dairy farming	-0.160*
X ₆	Land holding	0.087 ^{NS}
X ₇	Herd size	0.268**
X ₈	Annual income	0.203**
X ₉	Extension training	0.252**
X ₁₀	Mass media exposure	0.213**
X ₁₁	Innovativeness	0.355**
X ₁₂	Knowledge	0.272**
X ₁₃	Attitude	0.169*

** Significance at 0.01 level of probability

* Significance at 0.05 level of probability

NS - Non-significant

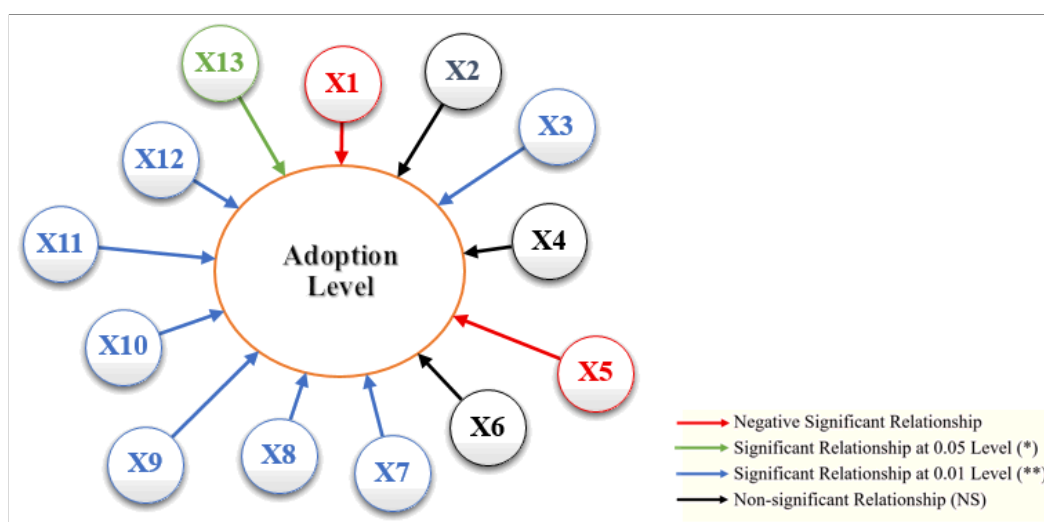


Figure 2. Correlation of different variables with adoption level of scientific feeding practices

The correlation analysis presents a clear pattern: adoption of scientific feeding practices was more closely associated with farmers' capacity to learn, innovate and access information than with their basic demographic or resource characteristics. Innovativeness emerged as the strongest positive correlate of adoption ($r = 0.355$), followed by knowledge ($r = 0.272$) and herd size ($r = 0.268$), while education, annual income, extension training and mass-media exposure also showed significant positive associations. Conversely, age ($r = -0.167$) and dairy farming experience ($r = -0.160$) exhibited significant negative relationships, suggesting comparatively lower adoption among

older and more experienced farmers. Gender, family size and land-holding did not show significant relationships with adoption. Overall, the findings suggest that a farmer's openness to innovation, knowledge base and exposure to extension and information sources may be more influential in encouraging scientific feeding practices than land or family characteristics alone.

This is in agreement with Jaisridhar *et al.* (2013) [9], who reported that education status, herd size, frequency of contact and information-seeking behaviour were significantly correlated with adoption of scientific dairy farming practices among farmers in Tamil Nadu.

Table 3. Constraints faced by dairy farmers towards scientific feeding practices adoption

Rank	Major Constraint	Weighted Score	RPI
1	High cost of concentrate feed	530	17.67
2	Lack of knowledge about balanced ration	526	17.53
3	Lack of availability of improved varieties of fodder	522	17.40
4	Limited availability of land for fodder cultivation	519	17.30
5	Seasonal shortage of green fodder	506	16.87
6	High cost of fodder production	490	16.33
7	High labour requirement for fodder cultivation and feeding	481	16.03
8	Lack of fodder storage facilities	471	15.70
9	Lack of awareness regarding scientific feeding practices	465	15.50
10	High cost of mineral mixture	447	14.90

The major constraints faced by dairy farmers were assessed using a five-point response scale. Each respondent was asked to indicate the

level of importance of each constraint, and scores of 5, 4, 3, 2 and 1 were assigned to the responses “Very severe”, “Severe”, “Moderately severe”, “Less severe” and “Not severe”, respectively. The weighted score for each constraint was calculated by multiplying the frequency of respondents under each response category by its respective weight and summing the resulting values. The Response Priority Index (RPI) was then calculated by expressing the obtained weighted score as a percentage of the maximum possible weighted score. The constraints were ranked in descending order of their RPI values, with the highest RPI assigned Rank I.

The findings indicate that high cost of concentrate feed was the most important constraint, securing the highest weighted score (530) and RPI (17.67), and was ranked first. This was closely followed by lack of knowledge about balanced ration (526; RPI 17.53), highlighting both economic and knowledge-related barriers to scientific feeding. Lack of availability of improved fodder varieties (522; RPI 17.40) and limited land for fodder cultivation (519; RPI 17.30) occupied the third and fourth positions, respectively. Seasonal shortage of green fodder ranked fifth (506; RPI 16.87), indicating the importance of year-round fodder availability. Other constraints included high fodder production costs (RPI 16.33), high labour requirements (16.03), inadequate fodder storage facilities (15.70), lack of awareness regarding scientific feeding practices (15.50), and high cost of mineral mixture (14.90). Overall, the results demonstrate that feed affordability, balanced-ration knowledge, fodder availability and fodder-resource limitations were the major barriers to adoption of scientific feeding practices among dairy farmers.

These findings are consistent with those of Sabapara (2016) [10] in coastal Lokhande *et al.* (2012) [11] in Haryana, both of whom identified feed cost and fodder scarcity as the primary constraints in the adoption of scientific dairy husbandry practices."

Conclusions

Dairy farmers in Anand district were mostly middle-aged, male and moderately educated, with medium adoption of scientific feeding practices. Adoption was driven more by innovativeness, knowledge, and information access than by land, income or demographics. Major constraints were high concentrate feed cost, lack of balanced-ration knowledge and poor fodder availability. The study recommends stronger extension services, farmer training and better access to affordable feed/fodder to improve adoption and dairy productivity.

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