RESEARCH ARTICLE

Feeding Practices Followed by Dairy Cattle Farmers in Bhavnagar District of Gujarat State

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Abstract

A survey was conducted in the Bhavnagar district of Gujarat state from March to May 2025 to assess existing feeding practices followed by dairy cattle farmers. The study was carried out in six talukas. A multistage random sampling technique was adopted, wherein two villages from each taluka were randomly selected and 10 dairy cattle farmers owning 1-2 animals producing ≥ 6 kg milk per day were interviewed from each village. Thus, information was collected from 120 respondents using a structured questionnaire designed to obtain data on types of feeds and fodders offered, feeding schedules and management practices. The results revealed that all respondents (100%) practiced stall feeding. The majority of farmers (77.50%) provided a combination of concentrate, green fodder and dry fodder, while 19.17% and 3.33% offered concentrate with only dry fodder and only green fodder, respectively. All respondents used commercially available concentrates, mainly readymade concentrate mixtures, compound cattle feed, cottonseed cake, cottonseed and groundnut cake and none prepared homemade concentrate mixtures. Most farmers (91.67%) fed concentrates twice daily and 58.33% offered it in unprocessed form. Jowar, Napier, maize, lucerne and marvel grass were the principal green fodders, whereas jowar hay and groundnut gotar were the predominant dry roughages. Mineral mixture supplementation was adopted by only 12.50% of respondents. Water was provided *ad libitum* though watering frequency varied from 2-4 times daily. Furthermore, 60% of farmers provided concentrates during the dry period, 68.33% offered pregnancy allowances and 79.17% followed special feeding after calving. The study indicates predominance of conventional feeding practices and limited adoption of scientific nutritional interventions, underscoring the need for targeted extension programmes to promote balanced feeding and improve dairy cattle productivity in the district.

Key words: Bhavnagar district, Cattle feeding, Dairy cattle farmers, Feeding practices.

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Introduction

Livestock plays a very important role in supporting rural livelihoods, improving nutrition, protecting the environment and strengthening Indian agriculture. Over the past few decades, the livestock sector has shown remarkable growth and has significantly contributed to the overall progress of agriculture in the country. Dairying is the largest agricultural enterprise in India and contributes nearly 5% to the national economy. India ranks first in the world in milk production, supplying about 23% of global milk output. The growing demand for milk and livestock products, along with increasing population and urbanization, has placed pressure on limited feed and fodder resources. Shrinking grazing lands and imbalanced feeding practices further reduce animal productivity (Gupta *et al*., 2008). Many farmers do not follow scientific feeding practices and often provide feed without considering the animal's requirements, stage of lactation / pregnancy, or quality of fodder. Since feeding plays a key role in animal health and milk production, understanding the existing feeding practices of farmers is essential. Such knowledge will help in planning need-based extension programmes to promote balanced feeding and improve dairy animal productivity under village conditions (Patel *et al.,* 2019). Hence this study was undertaken in Bhavnagar district of Gujarat.

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Materials and Methods

The study was conducted on dairy cattle from different talukas of the Bhavnagar district, situated in the south-eastern part of the Saurashtra region of Gujarat state.

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The district consists of 10 talukas. For the present study six talukas, *viz.,* Bhavnagar, Talaja, Sihor, Mahuva, Palitana and Umrala were randomly selected. From each selected taluka, two villages were chosen at random. In this way, a total of 12 villages were selected in such a way that they were geographically located apart in direction and truly represented the animal husbandry practices of the district and talukas.

A multistage random sampling technique was used to select the respondents. From each village, 10 respondents who owned 1-2 dairy cattle having ≥ 6 kg of milk per day were selected for the study. In total, 120 dairy cattle farmers were interviewed and information of 153 dairy cattle was collected from these farmers. Information regarding the types of feeds and fodders offered to the cattle, feeding schedule, feeding pattern, etc., was collected with a fair degree of precision from individual farmers using the standard sampling procedure. The two-way chi-square test was carried out to know the distribution of respondents in six talukas for particular managemental practices using the MedCal statistical software.

Results and Discussion

In Bhavnagar district, dairy cattle are typically reared under mixed farming systems that combine agriculture with livestock rearing. Farmers mainly depend on locally available feed resources and most follow conventional rather than scientific feeding practices. The diet of the animals generally consists of green fodder, dry fodder, concentrates and various agricultural residues and byproducts. The type and quality of feed provided to cattle are largely determined by the seasonal availability of fodder. The feeding practices observed during the survey are summarized in Table 1.

Feeding System

The data presented in Table 1 reveal that all surveyed dairy cattle owners (100%) across the six talukas practiced stall feeding as the sole feeding system. None of the farmers followed grazing-only or combined stall feeding and grazing systems. These findings were consistent with those of Kochewad *et al.* (2013), Rathva and Sorathiya (2019) and Balami and Chaulagain (2025), reported that in the East Ganga Command Area, Navsari district of South Gujarat and in Kavre district, respectively, stall feeding was the predominant feeding system practiced by the majority of animal owners. However, these results differ from several studies that reported widespread adoption of a combined stall-feeding and grazing system. Sabapara (2016), Bhagat *et al.* (2021) and Kapgate *et al.* (2024) observed that most farmers in Navsari district of Gujarat, Surajpur district of Chhattisgarh and Bhandara district of Maharashtra, respectively, followed a mixed feeding system incorporating both stall feeding and grazing.

Types of Feed Offered

The majority (77.50%) of dairy cattle owners across the six talukas followed the practice of offering a combination of concentrate, green fodder and dry fodder. About 19.17% of farmers provided concentrate along with dry fodder because of the limited availability of green fodder due to lack of irrigation, while a small proportion (3.33%) offered concentrate with green fodder. A significant ($p<0.05$) difference in types of feed being fed to cattle by respondents was found among the six talukas, which concurred with that reports of Jadav *et al.* (2014), Kapadiya *et al.* (2022) and Kasondra (2022) from different districts of Gujarat. In contrast, Bhagat *et al.* (2021) reported that nearly all farmers supplied concentrates together with dry fodder in Surajpur district of Chhattisgarh.

Feeding of Concentrate

All the surveyed cattle owners (100%), regardless of herd size, included concentrate feeds in their animals' diets. Feeding concentrates to dairy animals is a widely adopted practice among farmers in different regions of Gujarat (Patel *et al.,* 2016; Sabapara and Fulsoundar, 2016; Rathva and Sorathiya, 2019; Gadhavi *et al.,* 2020; Kapadiya *et al.,* 2022; Kasondra, 2022). It was found that all the cattle owners (100%) used commercially available separate concentrate mixtures for feeding, whereas none of them (0.00%) prepared or relied on homemade concentrate mixtures. The present findings differ from those of Sabapara and Fulsoundar (2016), Mouli *et al.* (2022) and Saurav *et al.* (2023), who reported that most farmers provided either only homemade concentrate mixtures or a combination of homemade and compound cattle feed in Surat district of Gujarat, Chittoor district of Andhra Pradesh and in north Bihar, respectively.

Types of Concentrate

The different types of concentrates provided to dairy cattle are shown in Table 1 and 2. Cattle owners in the district used a variety of concentrate feeds, including cottonseed cake, groundnut cake, cottonseed, wheat bran, udad chuni, Sarvottam dan (compound cattle feed manufactured by Bhavnagar District Cooperative Milk Producers' Union Limited), Maahi dan (compound cattle feed manufactured by Maahi Milk Producer Company Limited) and other commercial readymade concentrate mixtures available locally. Among these, feeding readymade concentrate mixtures of cooperatives as the sole concentrate source was the most common practice, followed by the use of other compound cattle feeds that were easily available within the district.

Frequency of Feeding & Processing of Concentrate

The majority of cattle owners (91.67%) across the six talukas fed concentrate twice daily, while only a small proportion (8.33%) provided concentrate once a day (Table 1). A highly

Table 1: Distribution of the dairy cattle owners according to feeding practices followed in Bhavnagar district

Practices	Criteria	Talaja (n=20)	Sihor (n=20)	Palitana (n=20)	Bhavnagar (n=20)	Mahuva (n=20)	Umrala (n=20)	Overall (n=120)	Overall (%)
Feeding system	Stall feeding	20	20	20	20	20	20	120	100.00
	Grazing only	0	0	0	0	0	0	0	0.00
	Stall feeding + grazing	0	0	0	0	0	0	0	0.00
Types of feed offered	Concentrate + Dry fodder	1	0	2	7	7	6	23	19.17
($\chi 2$, 22.5* p=0.0127)	Concentrate + Green fodder	0	2	0	2	0	0	4	3.33
	Concentrate +Green + Dry	19	18	18	11	13	14	93	77.50
Types of concentrate	Separate concentrate mixture	20	20	20	20	20	20	120	100.00
	Homemade concentrate mix.	0	0	0	0	0	0	0	00.00
Frequency conc. feeding	Once	0	6	0	0	3	1	10	8.33
($\chi 2$, 19.2** p=0.0018)	Twice	20	14	20	20	17	19	110	91.67
Processing of conc.	Dry/ As such	5	5	18	17	12	13	70	58.33
	Soaking	15	15	2	3	8	7	50	41.67
	Cooking	0	0	0	0	0	0	0	0.00
Process of green fodders	Yes	3	0	5	0	0	1	9	7.50
($\chi 2$, 15.5** p=0.0084)	No	17	20	15	20	20	19	111	92.50
Feeding of min mix	Yes	2	0	4	6	1	2	15	12.50
($\chi 2$, 10.7 p=0.0567)	No	18	20	16	14	19	18	105	87.50
Frequency of watering	2 times	6	2	4	6	3	2	23	19.17
($\chi 2$, 18.9* p=0.0415)	3 times	14	12	10	8	6	10	60	50.00
	4 times	0	6	6	6	11	8	37	30.83
Feeding of conc.	Yes	8	13	16	12	13	10	72	60.00
during dry period	No	12	7	4	8	7	10	48	40.00
Pregnancy allowance	Yes	7	13	15	14	18	15	82	68.33
	No	13	7	5	6	2	5	38	31.67
Special feeding after	Yes	15	16	17	14	18	15	95	79.17
calving ($\chi 2$, 3.28 p=0.6563)	No	5	4	3	6	2	5	25	20.83

**$p < 0.01$, *$p < 0.05$

significant variation ($p<0.01$) was recorded in the frequency of concentrate feeding among cattle owners across the six talukas.

58.33% of the respondents fed concentrate in dry form without any prior processing, whereas 41.67% soaked the concentrates before feeding (Table 1). None of the farmers (0.00%) practiced cooking of concentrate before feeding to animals. These findings were consistent with those of Mohad *et al.* (2020), who observed that most farmers did not apply any form of treatment to concentrate feeds prior to feeding their animals in Chandrapur district of Maharashtra. However, the results contradict the findings of several other researchers. Rathore *et al.* (2010) found that 78.50% of respondents in the Churu district of Rajasthan practiced concentrate processing before feeding to cattle. Sabapara and Fulsoundar (2016) reported that 65% of respondents in the Surat district of South Gujarat processed concentrates before feeding them to dairy animals.

It was found that a majority of the respondents (60.00%) provided concentrate feed to their animals during the dry period, whereas 40.00% did not follow this practice (Table 1), the difference was non-significant, suggesting that the practice of concentrate feeding during the dry period did not differ significantly across the six talukas.

Types of Fodders

Green fodder was available to about 80.83% of the respondents for feeding to their cattle and was extensively grown across the Bhavnagar district. The main varieties of green fodder observed in the area included lucerne, Napier, marvel grass, maize and jowar. Among these, green jowar and lucerne were the most frequently utilized. Dry fodder was available in 96.66% of the households and served as the main component of cattle feed. The predominant types of dry roughages identified included groundnut gotar or haulm and jowar hay. Among these, jowar hay was the most commonly utilized for feeding of cattle, followed by groundnut gotar or haulm.

Processing of Roughages

In the study area, fodder processing was found to be a very uncommon practice (Table 1). Only 7.50% of respondents reported chaffing of green fodder, while the vast majority (92.50%) fed it without chaffing. Likewise, just 6.67% of farmers processed dry fodder, whereas 93.33% provided it unprocessed. The variation in processing of green and dry fodders across areas was found highly significant ($p < 0.01$). Research conducted across Gujarat clearly shows that most farmers routinely feed roughages to dairy animals in an unprocessed form. For example, Sabapara and Fulsoundar (2016), Patel *et al.* (2019) and Kasondra (2022) reported that the majority of respondents in Surat, Valsad and Junagadh district (95%, 88.8% and 81.56%, respectively) practiced to feed green/dry fodders as such to their dairy animals. In contrast, dairy farmers in the Saharanpur district of Uttar Pradesh (Kumar *et al.,* 2019), Chandrapur district of Maharashtra (Mohad *et al.,* 2020) and in North Bihar (Saurav *et al.,* 2023) commonly preferred chaffing of roughages before feeding to animals.

Table 2: Types of concentrate being fed to dairy cattle in Bhavnagar district

Types	Frequency (n=120)	Percent
Homemade concentrate mixture	00	00
Separate feeding of concentrate mixture		
Cottonseed cake alone	25	20.83
Groundnut cake alone	6	5.00
Compound cattle feed* alone	29	24.17
Readymade mix alone	50	41.67
Cottonseed cake + Groundnut cake	1	0.83
Cottonseed cake + Readymade mix	3	2.50
Cottonseed cake + Compound concentrate mixture feed	1	0.83
Cottonseed + Wheat bran	1	0.83
Compound concentrate mixture + Udad chuni + CSC	1	0.83
Compound concentrate mixture + Readymade mix	3	2.50
Total (A+B)	**120**	**100**

*BIS type II compound cattle feed manufactured by Bhavnagar District Cooperative Milk Producers' Union Limited and Maahi Milk Producer Company Limited

Feeding of Mineral Mixtures

Most of the respondents (87.50%) in the study area did not provide mineral mixture in any form to their dairy cattle. Only a small proportion (12.50%) reported offering a mineral mixture to their animals. In the study area, the main reasons for not using mineral mixture were its high cost, the belief that it was not necessary and a lack of awareness about its benefits. Research conducted in Gujarat revealed variation in practices of offering mineral mixture to animals. Patel *et al.* (2016) found that most of the respondents (98.7%) didn't provide mineral mixtures to animals in Banaskantha district, while Sabapara (2016) and Sabapara and Fulsoundar (2016) reported that 38.0% and 58.33% of respondents in the Surat district provided mineral supplements to their dairy animals. Similarly, Kochewad *et al.* (2013) in the East Ganga Command Area observed that only 15.5% of farmers supplemented mineral mixtures to their dairy animals, while Henry *et al.* (2021) in the Cauvery Delta region of Tamil Nadu found that 65.56% of respondents practiced supplementary feeding, primarily through mineral mixtures (64.40%), followed by salt (13.56%) for dairy cattle.

Frequency of Watering

All the respondents provided water to their cattle *ad libitum* in terms of quantity, but restricted it in terms of frequency.

It was observed that the majority of respondents (50.00%) provided water to their animals three times a day, followed by those who offered water four times a day (30.83%). A smaller proportion of respondents (19.17%) reported watering twice a day. The statistical analysis revealed a significant difference ($p < 0.05$) among different watering frequency groups across the six talukas. The present results agreed with the findings of Jadav *et al.* (2014), Jadav (2018), Kumar *et al.* (2019) and Bhagat *et al.* (2021), who observed that the majority of respondents were generally offering water three times a day to their animals. In contrast, these findings differed from those of Patel *et al.* (2016), Roy and Meena (2020) and Saurav *et al.* (2023), who reported that the majority of respondents offered water to their animals only two times a day.

Pregnancy Allowances

Regarding the provision of pregnancy allowance during the advanced stage of pregnancy, it was observed that 68.33% of the respondents offered additional concentrate feed to their animals, generally starting 2 to 4 weeks prior to calving, whereas 31.67% did not provide any such allowance ($p < 0.01$). These findings were in agreement with earlier researches conducted in Gujarat, where most of the respondents in Navsari (Sabapara, 2016), Surat (Sabapara and Fulsoundar, 2016) and in Amreli (Kapadiya *et al.*, 2022) districts were providing pregnancy allowances to advanced pregnant animals. Further, in the Churu district of Rajasthan, 65.50% of farmers offered concentrates to pregnant cows (Rathore *et al.,* 2010). Similar findings were recorded by Mohad *et al.* (2020) in Chandrapur district of Maharashtra and Kapgate *et al.* (2024) in Bhandara district of Maharashtra. Conversely, Ghuge *et al.* (2017) found that the practice of providing additional rations to pregnant dairy animals was very low (6%) in the Nanded district of Maharashtra.

Special Feeding after Calving

A majority of farmers (79.17%) in the study area offered additional or special feed to their cattle after calving, whereas 20.83% of farmers did not provide any type of special feeding during this period. The ration fed to cattle following calving was supplemented with special ingredients such as jaggery, jaggery mixed in lukewarm water, edible oil, ghugari (cooked grains) and vegetable ghee, which were commonly offered to freshly calved animals for 7 to 10 days by most of the respondents. The offering of special feed to animals after calving has been a widely adopted practice among dairy farmers across various regions of Gujarat. Sabapara and Fulsoundar (2016) observed that the majority (72.67%) of respondents followed special feeding after calving in Surat district. Similar observations have been recorded by Jadav (2018) in the Panchmahal district, Patel *et al.* (2019) in Valsad district, Kapadiya *et al.* (2022) in Amreli district and Kasondra (2022) in Junagadh district. Further, Kumar *et al.* (2019) from Saharanpur district of Western Uttar Pradesh also reported that the majority (88.50%) of farmers practiced special feeding after calving.

Conclusions

The findings of the present study indicated that dairy cattle in Bhavnagar district are predominantly maintained under a stall-feeding system, with farmers mainly depending on commercially prepared concentrates, unprocessed roughages and locally available feed resources. Feeding practices were largely conventional, with minimal adoption of scientific measures such as fodder processing and mineral mixture supplementation. Seasonal fluctuations in fodder availability played a decisive role in determining the type and quality of feed offered to cattle. Nevertheless, practices such as concentrate feeding, pregnancy allowances and special post-calving feeding were widely followed, reflecting farmers' awareness of critical nutritional needs during key physiological stages. The findings of non-followed scientific feeding practices particularly underscoring the need for targeted extension programmes to promote balanced feeding and improve dairy cattle productivity in the district.

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