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Constraints perceived and suggestions elicited by farmers in adoption of recommended bovine management practices

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Abstract

Livestock production and agriculture in India are intrinsically linked and together form a critical foundation for food security, rural livelihoods and economic resilience. The animal husbandry sector plays a vital role in enhancing farm income, ensuring nutritional security and providing year-round employment to millions of rural households, particularly small and marginal farmers, women and landless labourers. Despite India possessing the world's largest livestock population and being the leading global milk producer, bovine productivity remains comparatively low. This gap is largely attributed to constraints related to feeding, breeding, management, healthcare and marketing, which limit the effective adoption of recommended bovine management practices.

The present study was undertaken to identify farmer-perceived constraints and elicit actionable suggestions to inform evidence-based livestock development policies. An ex-post-facto research design was employed in Udaipur and Banswara districts of southern Rajasthan. A total of 240 farmers were selected from 16 villages using random sampling techniques. Primary data were collected through a structured interview schedule and analyzed using frequency, percentage, mean, standard deviation, mean percent score and ranking.

Results indicated that marketing constraints were the most severe, recording the highest overall MPS (85.47), followed by feeding (82.22), healthcare (78.30), management (77.12) and breeding constraints (76.17). The perception that bovine rearing was uneconomical emerged as the dominant marketing barrier (MPS 94.31), reflecting weak price realization, limited cooperative presence and inadequate market infrastructure. Feeding constraints primarily involved high concentrate prices and fodder scarcity, highlighting the need for feed security interventions. Breeding constraints were associated with inadequate access to pedigree bulls, weak artificial insemination outreach and low productivity of local breeds. Management challenges centered on the high cost of housing and limited knowledge of scientific care for pregnant and lactating animals. Healthcare barriers reflected gaps in preventive knowledge on hygiene and vaccination.

Policy implications include strengthening last-mile extension, expanding mobile veterinary and artificial insemination services, promoting low-cost housing and balanced feeding models and investing in dairy cooperatives, value addition and transparent pricing mechanisms. Targeted capacity-building, inclusive credit access and digital advisory platforms are essential to enhance adoption, resilience and incomes. The study provides actionable insights to guide region-specific, farmer-centric livestock policy.

Keywords: Bovine management practices, constraints, livestock extension, dairy farmers, marketing systems

Introduction

Livestock production and agriculture in India are intrinsically linked and together constitute a cornerstone of food security, rural livelihoods and economic resilience. The animal husbandry sector plays a vital role in enhancing farm income, ensuring nutritional security and providing year-round livelihood support to millions of rural households, particularly small and marginal farmers, women and landless laborers. Beyond income generation, livestock contributes significantly through milk, meat and other animal products, draught power, organic manure, biogas production and serves as a form of financial and social security during times of crisis. India's vast livestock wealth and its position as the world's largest milk producer underline the immense potential of this sector in strengthening the agricultural economy and improving rural well-being.

Despite these strengths, the productivity of Indian bovines remains relatively low compared to global standards. This gap is primarily attributed to the high incidence of infectious and production-related diseases, inadequate veterinary and extension services, limited availability of quality inputs and low adoption of scientific bovine management practices. Many farmers continue to rely on traditional knowledge and

practices due to lack of timely, location-specific and practical information. Constraints such as poor awareness, economic limitations and weak extension outreach further hinder the effective adoption of recommended technologies. Therefore, strengthening farmer-oriented extension mechanisms and understanding ground-level challenges are crucial for improving livestock productivity and sustainability.

In this context, the present paper is undertaken to identify the constraints perceived by farmers and to elicit their suggestions regarding the adoption of recommended bovine management practices, so as to generate field-based insights for strengthening extension strategies and policy interventions.

Materials and Methods

An Ex-post-facto research design was used in the present study. The study was conducted in southern Rajasthan, which consists of seven districts namely Udaipur, Rajsamand, Banswara, Dungarpur, Chittorgarh Pratapgarh. Out of these, two districts *viz*., Udaipur and Banswara were purposely selected on the basis of highest bovine population. Two tehsils from each identified district were selected for study based on the highest cattle population. Therefore, a total of four tehsils were selected for the study. From each selected tehsil one First Grade Veterinary Hospital was selected. From 5 km periphery of the selected FGVHs four villages were randomly selected from each of the tehsils, resulting in a total sample of 16 villages (8 tribal and 8 non-tribal). From each selected village 15 farmers were randomly selected. Thus, a total of 240 farmers were selected for this study. A comprehensive structured interview schedule was developed keeping the study objectives in mind. Data was collected using personal interview techniques with developed schedules and various statistical measures were used for analysis, including Percentage and Frequency distribution, Mean, SD, MPS and Rank.

Results and Discussion

The term constraint means all those barriers or obstacles, which were perceived by farmers in adoption of recommended bovine management practices. The data on these constraints have been analyzed and categorized into feeding, breeding, management, healthcare and marketing constraints. This categorization is based on the calculated MPS and ranked accordingly. The results are presented in the following tables.

1. Aspect wise constraint perceived by farmers in adoption of recommended bovine management practices

To obtain a comprehensive overview of the major constraints perceived by farmers during and after the adoption of recommended bovine management practices, the responses were categorized into distinct aspects. For each aspect, the MPS was calculated to determine the relative severity of constraints as perceived by the farmers. Based on the MPS, each constraint category was ranked accordingly. The aspect-wise distribution of these constraints provides valuable insight into the critical areas that require policy attention and support mechanisms for improving the adoption process.

The aspect-wise findings have been presented in Table 1 that follow, identifying the most and least severe constraints as perceived by farmers.

Table 1: Aspect wise constraint perceived by farmers in adoption of recommended bovine management practices

Sr. No.	Constraint	Udaipur (n_1=120)		Banswara (n_2=120)		Overall (n=240)	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Feeding constraint	77.45	2	86.99	2	82.22	2
2.	Breeding constraint	74.84	4	77.50	5	76.17	5
3.	Management constraint	73.75	5	80.49	3	77.12	4
4.	healthcare constraint	76.88	3	79.72	4	78.30	3
5.	Marketing constraint	83.39	1	87.56	1	85.47	1

Table 1 showed that marketing constraint was the most significantly perceived constraint overall, with a MPS of 85.47. This suggested that farmers felt the most constrained by issues related to marketing their bovine products. Feeding constraint ranked second overall, with an MPS of 82.22. This indicated that difficulties related to feeding their animals were a major concern for farmers. Healthcare constraint was the third most significant concern, with an MPS of 78.30, followed by management constraint with an MPS of 77.12. Breeding constraint ranked as the least significant among the five aspects, with an MPS of 76.17.

In Udaipur, marketing constraint had the highest MPS (83.39), followed by feeding constraint (77.45). Similarly, in Banswara, marketing constraint was also the most significant (MPS 87.56), followed by feeding (86.99). The ranks were consistent across both districts for the top two constraints, indicating that marketing and feeding were the primary concerns in both regions. Healthcare constraint (MPS 78.30), management constraint (MPS 77.12) and breeding constraint (MPS 76.17) were perceived as less significant, ranking third, fourth and fifth, respectively. However, the specific MPS values and the rankings of the other three constraints varied slightly between Udaipur and Banswara.

Kaur *et al.* (2022) [2] observed that, in Punjab, farmers scored highest in knowledge and adoption of feeding systems (such as stall feeding), maintenance of housing cleanliness and calf care. In contrast, breeding technology and its practical adoption were the lowest, illustrating a common national trend where technical and resource constraints disproportionately affect the uptake of advanced bovine management practices. This aspect-wise analysis highlights that, despite reasonable awareness in areas related to daily animal care, more complex, capital-intensive, or knowledge-dependent interventions continue to face substantial barriers.

2. Feeding related constraint perceived by farmers in adoption of recommended bovine management practices

Table 2: Feeding related constraint perceived by farmers in adoption of recommended bovine management practices

Sr. No.	Feeding Constraint	Udaipur (n_1=120)		Banswara (n_2=120)		Overall (n=240)	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Non-availability of quality green fodder	73.61	6	76.11	5	74.86	5
2.	Shortage of feed and fodder	76.94	1	78.06	3	77.50	2
3.	High price of concentrate	75.83	2	80.56	1	78.19	1
4.	Inadequate knowledge about scientific feeding of dairy animals	75.28	3	79.17	2	77.22	3
5.	Inadequate knowledge about conservation of green fodder	73.33	7	75.28	7	74.31	7
6.	Short age of pasture land	74.72	4	77.78	4	76.25	4
7.	Lack of knowledge about Mineral mixture	74.17	5	75.56	6	74.86	5

A closer examination of the data showed a clear distinction between the two districts. In Udaipur, the primary constraint was the shortage of feed and fodder, with an MPS of 76.94, ranking first. This was followed by the high price of concentrate, ranking second with an MPS of 75.83. In contrast, farmers in Banswara identified the high price of concentrate as the most significant constraint (MPS 80.56, rank 1), with inadequate knowledge about scientific feeding practices ranking second (MPS 79.17, rank 2). This disparity indicated that while both economic and availability issues were prevalent, their relative importance differed across the regions. In Udaipur, physical scarcity was a more pressing issue, whereas in Banswara, the economic burden of high-cost feed was the primary concern.

The data further highlighted the less-perceived constraints, which included a lack of knowledge about conservation of green fodder and mineral mixtures, along with the non-availability of quality green fodder. These lower-ranked constraints suggested that farmers, while facing knowledge gaps, prioritized immediate, high-impact issues such as the cost and availability of essential feed over more technical or specialized knowledge. The findings implied that any interventions or policy measures aimed at improving feeding practices had to be tailored to address the specific priorities of each region, focusing on supply chain improvements in Udaipur and cost-effective feed alternatives or subsidies in Banswara.

Sharma (2021) [12] revealed significant feeding-related constraints, there remained substantial knowledge gaps and low adoption rates for essential fodder preservation methods, particularly hay and silage making. This disparity suggests that, while awareness of immediate green fodder feeding practices is widespread, long-term feed security through preservation remains an under-adopted management intervention among local dairy farmers.

3. Breeding related constraint perceived by farmers in adoption of recommended bovine management practices

Analysis of the feeding-related constraints in Table 3 revealed that farmers in both Udaipur and Banswara perceived these challenges differently, despite the overall top constraints being similar. As per the data, the most significant feeding constraint perceived by farmers in both districts was the high price of concentrate, which held the top rank overall with a MPS of 78.19. This was followed closely by the shortage of feed and fodder, which ranked second overall with an MPS of 77.50. Inadequate knowledge about scientific feeding of dairy animals also emerged as a major concern, ranking third overall with an MPS of 77.22.

Table 3: Breeding related constraint perceived by farmers in adoption of recommended bovine management practices

Sr. No,	Breeding constraint	Udaipur (n_1=120)		Banswara (n_2=120)		Overall (n=240)	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Lack of pedigree bull for natural service	79.17	2	96.94	1	88.06	1
2.	Lack of knowledge about breeding practices	81.39	1	90.56	2	85.97	2
3.	Repeat breeding in dairy animals	75.83	4	74.72	6	75.28	6
4.	Low productivity of local breeds	78.33	3	89.44	3	83.89	3
5.	Unsatisfactory results of artificial insemination	74.72	6	81.67	5	78.19	5
6.	Unavailability of AI facilities	75.28	5	88.61	4	81.94	4

The data in Table 3 on breeding-related constraints revealed that farmers in both districts perceived these challenges differently, with some key similarities and differences in their priorities. The most significant breeding constraint overall was the lack of a pedigree bull for natural service, with a MPS of 88.06, which ranked first. This was followed by the lack of knowledge about breeding practices, which ranked second overall with an MPS of 85.97. The third most significant constraint was the low productivity of local breeds, with an MPS of 83.89.

A detailed comparison between the two districts highlighted notable differences. In Udaipur, the most pressing constraint was the lack of knowledge about breeding practices, which had the highest MPS of 81.39. This was followed by the lack of a pedigree bull for natural service (MPS 79.17) and the low productivity of local breeds (MPS 78.33). Conversely, in Banswara, the lack of a pedigree bull for natural service was the most significant constraint, with an exceptionally high MPS of 96.94. This was followed by the lack of knowledge about breeding practices (MPS 90.56) and the low productivity of local breeds (MPS 89.44). The differences in rankings and MPS scores suggested that while knowledge gaps were a concern, the physical availability of suitable breeding infrastructure was a more dominant issue

in Banswara.

The least significant breeding constraints perceived by farmers overall were repeat breeding in dairy animals (MPS 75.28) and unsatisfactory results of artificial insemination (MPS 78.19). This implied that farmers were less concerned with the outcomes of breeding practices and more concerned with access to suitable services and foundational knowledge. The findings suggested that interventions to improve breeding practices should have prioritized providing access to quality breeding animals and services, particularly in Banswara, while focusing on farmer education and awareness in Udaipur.

Meena *et al.* (2020) [6] reported that breeding-related management constraints among dairy farmers in Dausa and Tonk districts, Rajasthan were closely linked to changing feeding patterns. Their study found that 66.52% of farmers possessed knowledge about and practiced chaffed green fodder or stall feeding, while only 34% still relied on complete grazing. This shift from traditional grazing toward semi-confinement and stall feeding reflects broader constraints and adaptations associated with modernizing bovine management.

4. Management related constraint perceived by farmers in adoption of recommended bovine management practices

The analysis of Table 4 of the management-related constraints perceived by farmers in Udaipur and Banswara revealed that economic factors and knowledge gaps were the primary barriers to adopting recommended practices. As per the data, the most significant management constraint overall was the high cost of cattle shed construction, which had the highest MPS of 80.00. This was followed by the lack of knowledge about scientific housing for dairy, which ranked second with an MPS of 78.75. Table also indicated that poor knowledge about the care and management of pregnant and lactating animals was a significant concern, ranking third overall with an MPS of 77.64.

A comparative analysis of the two districts highlighted a notable divergence in perceived priorities. In Banswara, the high cost of cattle shed construction was the most dominant constraint, with an exceptionally high MPS of 86.67. This strongly suggested that a lack of capital and the economic burden of infrastructure development were the primary deterrents for farmers in this region.

Table 4: Management related constraint perceived by farmers in adoption of recommended bovine management practices

Sr. No.	Management constraint	Udaipur (n_1=120)		Banswara (n_2=120)		Overall (n=240)	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Lack of knowledge about scientific housing for dairy	75.83	2	81.67	2	78.75	2
2.	High cost of cattle shed construction	73.33	3	86.67	1	80.00	1
3.	Lack of space for isolation of animals	68.89	4	75.28	4	72.08	4
4.	Poor knowledge about care and management of pregnant and lactating animals	76.94	1	78.33	3	77.64	3

In contrast, in Udaipur, the most significant constraint was the poor knowledge about the care and management of pregnant and lactating animals, with an MPS of 76.94. This finding implied that farmers in Udaipur were more concerned with specific knowledge gaps related to animal husbandry practices rather than the high cost of infrastructure.

This distinction in priorities between the two districts had significant implications. The data from Banswara suggested that interventions aimed at improving management practices had to first address the economic barriers to infrastructure investment. This could have involved providing subsidies, low-interest loans, or promoting low-cost housing models. For Udaipur, the findings pointed to a critical need for targeted educational programs and extension services that specifically focused on the scientific management of pregnant and lactating animals, as this was a key knowledge deficit for farmers in the region. The least-perceived constraint in both districts was the lack of space for isolation of animals, which ranked last overall, suggesting this was a minor issue compared to the other management challenges. The overall conclusion was that any strategy to improve management practices had to be context-specific and tailored to the unique economic and knowledge-based challenges of each district.

5. Healthcare related constraint perceived by farmers in adoption of recommended bovine management practices

Table 5: Healthcare related constraint perceived by farmers in adoption of recommended bovine management practices

Sr. No,	Healthcare constraint	Udaipur (n_1=120)		Banswara (n_2=120)		Overall (n=240)	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Lack of knowledge about vaccination against contagious disease	76.11	3	80.28	2	78.19	2
2.	Lack of knowledge about health and hygiene	78.61	1	81.39	1	80.00	1
3.	Lack of veterinary services in the village	76.94	2	79.44	3	78.19	2
4.	Costly veterinary treatment	75.83	4	77.78	4	76.81	4

The analysis of the healthcare-related constraints in Table 5 revealed that farmers in both districts faced significant challenges related to veterinary services and health knowledge, albeit with slight variations in their priorities. The most prominent constraint perceived by farmers overall was the lack of knowledge about health and hygiene, which ranked first with a MPS of 80.00. This was followed by the lack of knowledge about vaccination against contagious diseases and the lack of veterinary services in the village, which were tied for the second rank, each with an MPS of 78.19. The least significant concern was the costly veterinary treatment, ranking fourth with an MPS of 76.81. A closer look at the data from the two districts highlighted subtle differences in perception.

In Udaipur, the most significant constraint was the lack of knowledge about health and hygiene, with an MPS of 78.61. This was followed by the lack of veterinary services in the village, ranking second with an MPS of 76.94. Conversely, in Banswara, the lack of knowledge about health and hygiene remained the top constraint, with a slightly higher MPS of 81.39. This was followed by the lack of knowledge about vaccination against contagious diseases, which ranked second with an MPS of 80.28. The fact that knowledge gaps ranked as the top concern in both districts underscored a critical need for educational interventions.

The implications of these findings were clear: while the availability of veterinary services was a significant issue, the primary barrier to effective bovine healthcare was a lack of fundamental knowledge among farmers regarding health, hygiene and preventive measures like vaccination. This suggested that interventions focused solely on providing more veterinary clinics might not have been sufficient. Instead, a more effective strategy would have been to implement widespread educational campaigns or training programs to equip farmers with the knowledge necessary to maintain herd health and hygiene, which could in turn have reduced the need for costly treatments.

Rathod *et al.* (2016) [10] found that adoption of livestock vaccination in North India was most commonly constrained by lack of knowledge about vaccination, concerns over adverse effects and poor availability of veterinarians. Their multinomial logit analysis revealed that proximity to veterinary institutions and herd size were strongly correlated with full adoption of recommended vaccination practices; as knowledge and access improved, so did uptake.

6. Marketing related constraint perceived by farmers in adoption of recommended bovine management practices

The analysis of the marketing-related constraints in Table 6 revealed that farmers in both districts perceived these challenges as the most significant overall, with a strong consensus on the primary issue. Table 6 showed that bovine rearing was uneconomical, which was by far the most dominant constraint, with an exceptionally high MPS of 94.31 overall. This was followed by the lack of a co-operative society in the village (MPS 89.31) and the lack of knowledge of record keeping (MPS 87.78), ranking second and third, respectively, for the overall group. This data underscored that economic returns and market access were the most pressing concerns for farmers.

Table 6: Marketing related constraint perceived by farmers in adoption of recommended bovine management practices

Sr. No,	Marketing constraint	Udaipur (n_1=120)		Banswara (n_2=120)		Overall (n=240)	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Bovine rearing was uneconomical	91.67	1	96.94	1	94.31	1
2.	Distant market	74.72	5	77.22	5	75.97	5
3.	Lack of knowledge of record keeping	84.72	3	90.83	3	87.78	3
4.	Lack of co-operative society in village	87.50	2	91.11	2	89.31	2
5.	Lack of knowledge about making of value added dairy products	78.33	4	81.67	4	80.00	4

A detailed comparative analysis of the two districts revealed a consistent pattern of these perceptions, although with slight variations in the degree of constraint. In Udaipur, the most significant constraint was the perception that bovine rearing was uneconomical, with an MPS of 91.67. This was followed by the lack of a co-operative society (MPS 87.50) and a lack of knowledge of record keeping (MPS 84.72), which ranked second and third, respectively. Similarly, in Banswara, these three constraints held the top three ranks, with bovine rearing being uneconomical having an even higher MPS of 96.94. The lack of a co-operative society (MPS 91.11) and a lack of knowledge of record keeping (MPS 90.83) followed closely. The data also revealed the least-perceived marketing constraints were the lack of knowledge about making value-added dairy products and a distant market, ranking fourth and fifth, respectively, for the overall group. In Udaipur, the lack of knowledge about value-added dairy products (MPS 78.33) ranked fourth, while a distant market (MPS 74.72) ranked fifth. The same ranks were observed in Banswara, with the lack of knowledge about value-added dairy products having an MPS of 81.67 and a distant market having an MPS of 77.22.

The findings implied that while all the listed marketing constraints were significant, the primary barriers were the economic viability of bovine rearing and the absence of organized market channels. The consistency of these top-ranked constraints across both districts suggested that any interventions to improve the marketing of bovine products should prioritize addressing these fundamental issues.

Saravanan *et al.* (2021) [11] add that economic factors, including high cost of production and feed, are compounded by non-remunerative pricing and poor access to organized milk marketing, making bovine rearing seem uneconomical for most farmers in their survey of South Indian districts.

7. Suggestions Elicited by Farmers

Based on suggestions elicited directly from dairy farmers and supported by empirical research findings, his chapter presents strategic recommendations to alleviate the multifaceted constraints encountered by dairy farmers in breeding, feeding, management, healthcare and marketing.

To mitigate breeding-related challenges such as the lack of pedigree bulls, repeat breeding and low productivity of local breeds, it is essential to enhance artificial insemination (AI) services through improved availability of quality semen and expansion of mobile AI units. Training farmers on scientific breeding practices, estrus detection and recordkeeping is critical for improving reproductive efficiency. Promotion of crossbreeding programs and genetic improvement initiatives is also imperative for sustainable productivity enhancements. These recommendations align with similar findings by Mansaram (2018) [4] and Paul *et al.* (2023) [8], who emphasized AI network strengthening and genetic improvement as vital interventions.

Addressing feeding constraints involves establishing fodder banks and utilizing wastelands for green fodder cultivation, accompanied by farmer education on fodder conservation techniques including hay and silage making. Government

subsidies for quality seeds and concentrates, as well as community fodder nurseries, are instrumental in securing feed resources. Training farmers on balanced feeding, mineral supplementation and cost-effective ration formulation is necessary to optimize nutrition. These measures resonate with the suggestions of Singh *et al.* (2020) [13] and Halpati and Vahoniya (2023) [1], who underscored fodder resource development and scientific feeding practices.

Scientific housing practices can be improved through capacity-building programs and demonstrations promoting cost-effective construction using local materials, supported by financial subsidies or loans. Enhancing management knowledge covering care for pregnant and lactating animals, hygiene and recordkeeping can significantly improve animal welfare and productivity. Establishing model units and cooperative housing can facilitate smallholder access to infrastructure. These management improvement strategies have been similarly advocated by Rajput *et al.* (2022) [9] and Meena *et al.* (2024) [5].

The establishment of veterinary clinics and mobile health units within rural areas is crucial to counter the lack of accessible veterinary services and high treatment costs. Regular training on vaccination, deworming, grooming and quarantine protocols should be conducted to strengthen preventive healthcare. Affordable medicines and the involvement of para-veterinary workers can expand the reach of veterinary care. These healthcare improvements correspond with recommendations by Sharma (2021) [12] and Khairnar *et al.* (2025) [3], emphasizing preventive health and accessible veterinary infrastructure.

Formation and reinforcement of dairy cooperatives and self-help groups (SHGs) are central to overcoming marketing challenges such as non-remunerative prices and limited market access. Establishment of village-level milk collection centers, transparent pricing mechanisms and training on value addition through dairy product processing can raise farmer's earnings. Investment in rural marketing infrastructure, cold storage and digital marketing platforms will reduce logistic bottlenecks. Policy interventions ensuring fair pricing and regulating intermediaries are also advocated. These marketing strategies are supported by the findings of Mansaram (2018) [4], Pathade *et al.* (2021) [7] and Khairnar *et al.* (2025) [3].

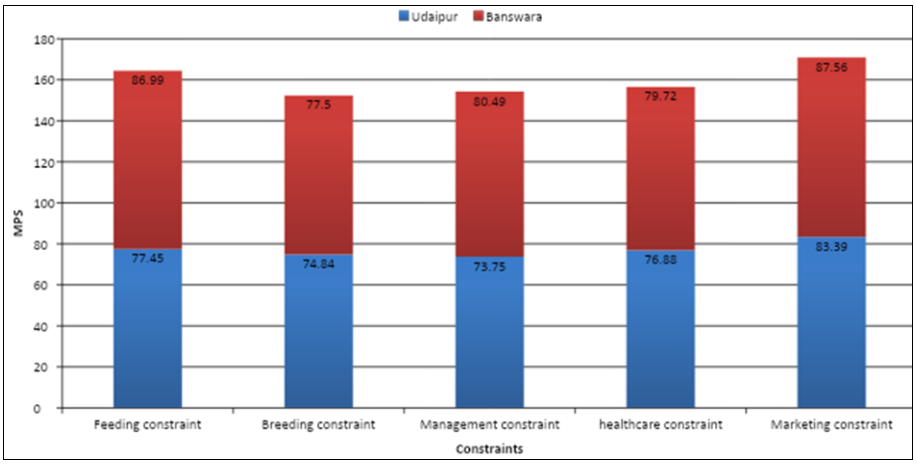

Fig 1: Aspect wise constraint perceived by farmers in adoption of recommended bovine management practices

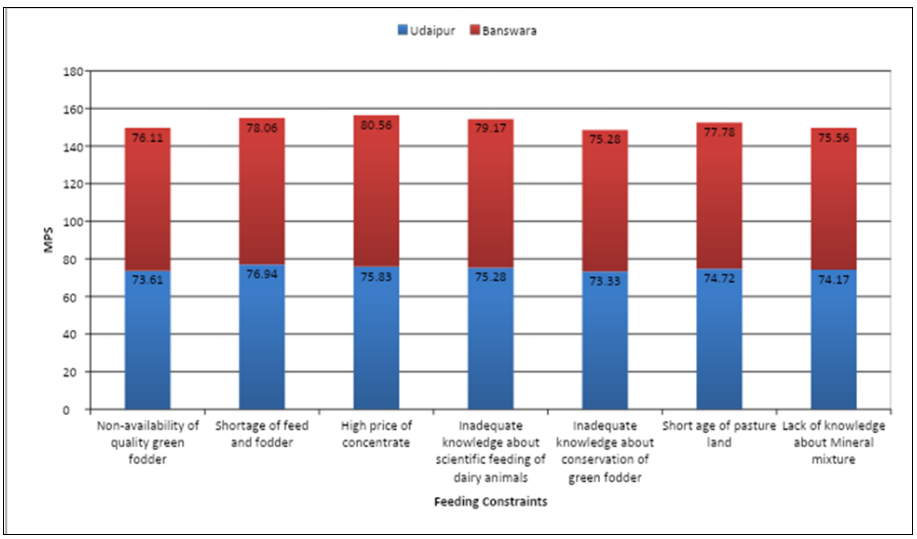

Fig 2: Feeding related constraint perceived by farmers in adoption of recommended bovine management practices

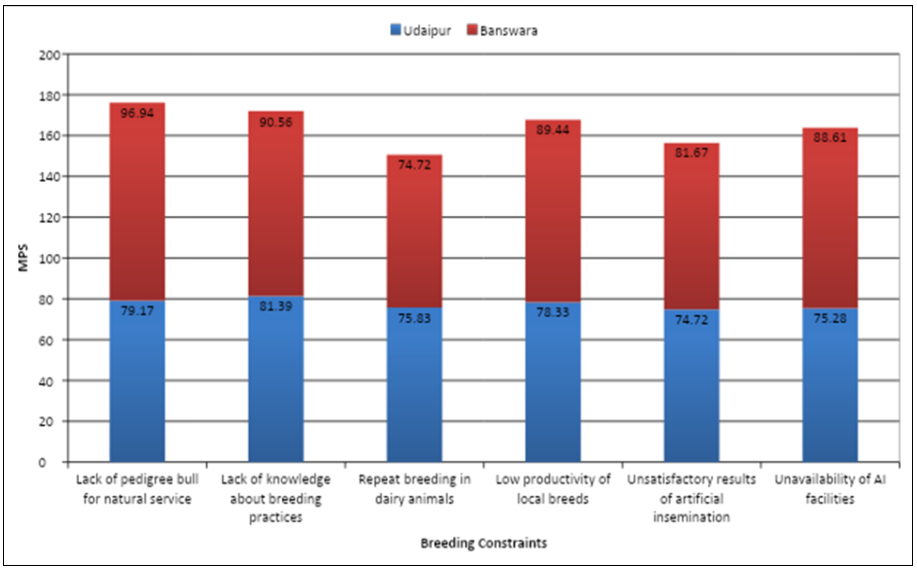

Fig 3: Breeding related constraint perceived by farmers in adoption of recommended bovine management practices

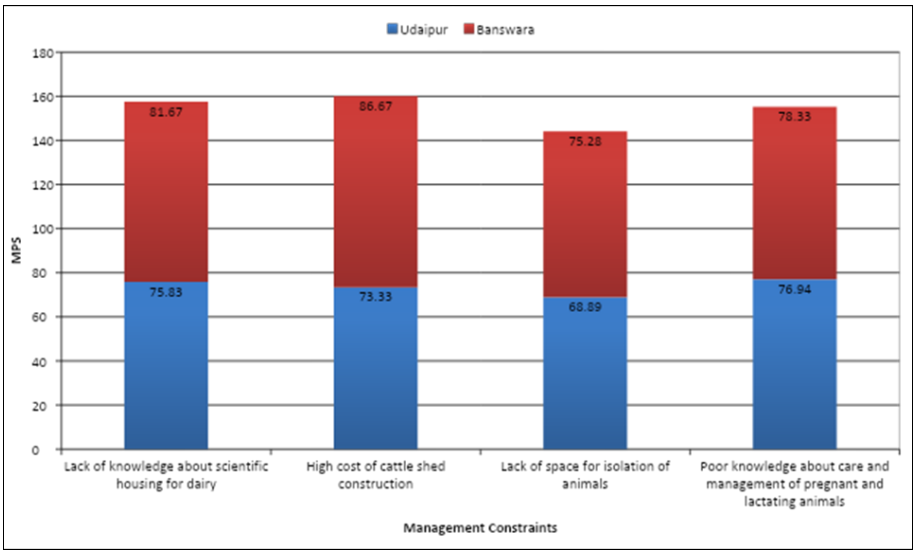

Fig 4: Management related constraint perceived by farmers in adoption of recommended bovine management practices

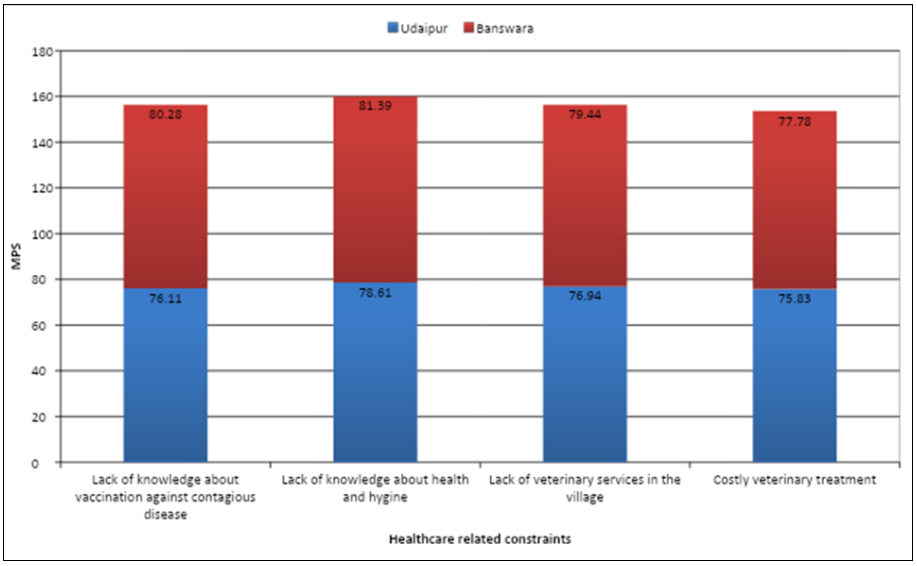

Fig 5: Healthcare related constraint perceived by farmers in adoption of recommended bovine management practices

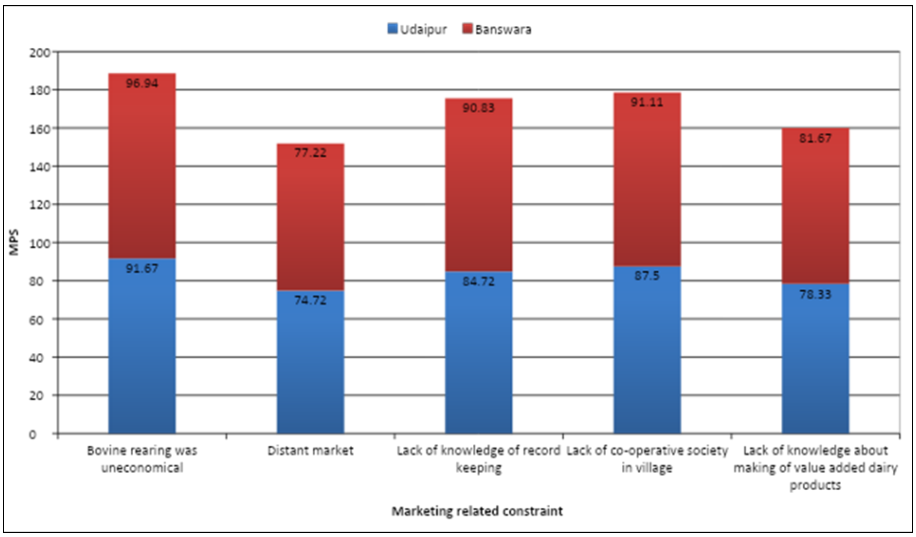

Fig 6: Marketing related constraint perceived by farmers in adoption of recommended bovine management practices

Conclusion

The present study comprehensively analyzed the constraints perceived by farmers in the adoption of recommended bovine management practices across Udaipur and Banswara districts. The findings revealed that marketing-related constraints emerged as the most severe, particularly the perception of bovine rearing being uneconomical and the lack of organized market structures such as cooperatives. Feeding constraints, especially the high cost of concentrate and shortage of feed and fodder, also posed major challenges, followed by healthcare, management and breeding constraints. Although the overall pattern of constraints was similar across both districts, notable regional variations were observed, indicating that farmers' priorities were influenced by local resource availability, economic conditions and access to services. Knowledge gaps related to scientific feeding, breeding, housing and healthcare practices were consistently evident, underscoring limitations in the effectiveness of extension outreach.

The study concludes that improving adoption of recommended bovine management practices requires a holistic and location-specific approach that simultaneously addresses economic, infrastructural and knowledge-based barriers. Strengthening marketing systems through cooperatives, improving access to affordable feed and veterinary services, promoting cost-effective housing models and enhancing farmer capacity through targeted extension and training programs are critical for sustainable dairy development. Policy interventions focused on institutional support, input subsidies and market linkages, combined with participatory extension strategies, can significantly enhance productivity, profitability and resilience of smallholder dairy farmers. Overall, the findings emphasize that addressing farmer-perceived constraints is essential for translating recommended bovine management practices into effective on-ground adoption.

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