

Constraints Faced by Crossbred Dairy Cattle Owners in Adoption of Feeding Management Practices

RL Hichami¹, MB Dhadwad², GK Sasane³, RH Rathod⁴, RG Nimase⁵, BB Bhingarde⁶, SD Shinde⁷, SV Sable⁸

^{1,4,8}*M.Sc. Research Scholar, Department of Agricultural Extension Education, (MPKV), Rahuri, District Ahilyanagar, Maharashtra, India*

^{2,6}*Assistant Professor, Department of Agricultural Extension Education, (MPKV), Rahuri, District Ahilyanagar, Maharashtra, India*

³*Professor, Department of Agricultural Extension Education, (MPKV), Rahuri, District Ahilyanagar, Maharashtra, India*

⁵*Associate Professor, Vet. Science, Veterinary Polyclinic, RCDP on cattle, (MPKV), Rahuri, District Ahilyanagar, Maharashtra, India*

⁷*Assistant Professor, Department of Agricultural Statistics, (MPKV), Rahuri, District Ahilyanagar, Maharashtra, India*

Abstract—This study investigates the constraints faced by crossbred dairy cattle owners in the adoption of feeding management practices followed by dairy cattle owners in Ahilyanagar district of Maharashtra state. The sample size constituted 120 farmers drawn from two talukas of Ahilyanagar district, viz Sangamner and Kopergaon. The farmers were interviewed with the help of a specially designed interview schedule. Garrett's ranking technique was applied to constraints faced by cross-bred dairy cattle owners in the adoption of feeding management practices. The analysis revealed a clear hierarchy of choices, with inadequate knowledge about stage-wise feeding management of dairy cattle (Rank I), followed by high cost of concentrate feed (Rank II), non-availability of green fodder throughout the year (Rank III), lack of knowledge about feeding of balanced feeds and mineral (Rank IV), and timely unavailability of quality fodder seeds (Rank V). Promoting awareness among farmers through Krishi Vigyan Kendra's (KVKs) and State Agricultural Universities (SAUs) about scientific feeding management practices can significantly help the farmers to overcome this constraint.

Index Terms—Feeding, feeding management practices, crossbred cattle, Garrett's ranking technique

I. INTRODUCTION

Livestock is an integral component of Indian agriculture and plays a crucial role in ensuring food

security, nutritional security, income generation, employment opportunities and sustainable rural development. The sector provides livelihood support to millions of rural households, particularly small and marginal farmers, landless labourers and women. Livestock serves as a source of milk, meat, eggs, wool, manure and draught power and contributes significantly to the socio-economic development of the country. After land and irrigation, livestock is considered one of the most valuable productive assets owned by rural households. Approximately two-thirds of the rural population depends directly or indirectly on livestock-based activities for livelihood support. The livestock sector contributes about 4.11 per cent to the national Gross Domestic Product (GDP) and nearly 25.6 per cent to the Agricultural GDP (DAHD, 2025). Among the various livestock enterprises, dairying occupies a prominent position in the Indian economy. Dairy farming provides regular income throughout the year and contributes significantly to nutritional security. Milk is regarded as a complete food because it contains proteins, fats, carbohydrates, vitamins and minerals in balanced proportions. Increasing population, urbanization, changing food habits and rising incomes have led to a continuous increase in demand for milk and milk products. India continues to maintain its position as the world's largest

milk-producing country. According to the Department of Animal Husbandry and Dairying (2025), total milk production in India reached 247.87 million tonnes during 2024–25, registering a growth of 3.58 per cent over the previous year. Per capita availability of milk increased from 130 g/day during 1950–51 to 485 g/day during 2024–25. The dairy sector has recorded a compound annual growth rate of more than 5 per cent during the last decade. This remarkable growth reflects the success of dairy development programmes, scientific feeding practices, genetic improvement of dairy animals, better veterinary healthcare and improved management practices (DAHD, 2025). Maharashtra is one of the leading agricultural and industrial states of India. Agriculture and allied sectors continue to play a vital role in the state's economy despite rapid industrialization. Dairy farming is widely practiced throughout Maharashtra and serves as a major subsidiary occupation for farming households. Livestock contributes nearly 3 per cent to the Gross State Domestic Product (GSDP) of Maharashtra. Milk production in Maharashtra has increased considerably over the years. The state produced approximately 166.26 lakh metric tonnes of milk during 2024–25 compared to 101.52 lakh metric tonnes during 2015–16, indicating substantial growth in the dairy sector. Per capita milk availability in Maharashtra reached 358 g/day during 2024–25 (Economic Survey of Maharashtra 2025–26). Dairy farming provides regular employment and income opportunities to rural households and contributes significantly to the rural economy. Crossbreeding programmes have played a major role in increasing milk productivity in India. Crossbred cattle possess superior genetic potential for milk production compared to indigenous cattle. Government estimates indicate that the average milk productivity of crossbred cattle is approximately 7.5 litres per day, which is considerably higher than that of indigenous cattle. Consequently, crossbred cattle have become the backbone of commercial dairy farming systems in many parts of the country. According to the 20th Livestock Census, exotic and crossbred cattle constitute 32.93 per cent of the total cattle population of Maharashtra. Their population increased from 23.59 per cent in 2012 to 32.93 per cent in 2019 and reached approximately 46.07 lakh animals. The increasing population of crossbred cattle demonstrates farmers' preference for high-yielding dairy animals and their growing importance in dairy

development. However, the productive performance of crossbred cattle largely depends upon proper management practices. Scientific management practices such as feeding, breeding, housing, and healthcare are essential for realizing the full genetic potential of these animals (Verma, 2005; Ondarza & Tricarico, 2017). Among these management practices, feeding management is considered the most important determinant of milk production, reproductive performance, animal health, and farm profitability (Prajapati et al., 2020; Terefe & Walelegne, 2024). Ahilyanagar district occupies a prominent position in the dairy sector of Maharashtra. The district is recognized as one of the leading milk-producing districts in the state. The contribution of livestock to Gross District Domestic Product (GDDP) from agriculture and allied sectors increased from 33.7 per cent in 2011–12 to 41.1 per cent in 2020–21, indicating the growing importance of dairy farming in the district economy. According to the 20th Livestock Census, Ahilyanagar district has 937,955 crossbred cattle, 33,892 exotic cattle, 13,978 other exotic crossbred cattle, and 136,473 indigenous cattle. Crossbred cattle constitute the largest category of cattle population in the district, highlighting their importance in dairy production. Among the various tehsils, Sangamner and Kopergaon possess the highest cattle populations, with 93,512 and 49,192 animals, respectively. Therefore, these tehsils provide an ideal setting for studying feeding management practices followed by crossbred dairy cattle owners. Milk production, milk composition, and milk quality are influenced by several factors such as breed of animal, stage of lactation, health status, environmental conditions, and management practices (Akintan et al., 2025). Among all management factors, feeding management plays the most significant role. Scientific feeding practices enable dairy animals to express their full genetic potential and maintain optimum productivity (Akzar et al., 2023). Feed alone accounts for approximately 60–70 per cent of the total cost of milk production. Therefore, efficient feeding management is essential for achieving economic sustainability in dairy enterprises (Rajadurai et al., 2020). Despite the availability of scientific recommendations, dairy farmers continue to face several constraints. However, there is a paucity of empirical evidence on the severity of these constraints. Therefore, this study attempts to identify the major

constraints faced by the crossbred dairy cattle owners in scientific feeding management and rank order them on the basis of their severity as perceived by the crossbred dairy cattle owners.

II. MATERIALS AND METHODS

Collection of Data: Ahilyanagar district was selected because it records high milk production and a large cattle population in Maharashtra. The district comprises 14 tehsils. Sangamner and Kopargaon tehsils were purposively selected on the basis of their relatively higher cattle population. Crossbred cattle were selected because they constituted the largest proportion of cattle in the study area.

Selection of Villages and Respondents: Four villages were selected from each of the two selected tehsils. The villages covered were Sultanpur, Nimgaon, Jorve and Rajapur from Sangamner, and Takadi, Malharwadi, Yesgaon and Ranjhangaon from Kopargaon. Fifteen respondents were selected from each village, thus making a total sample size of 120 respondents.

Application of Garrett's Ranking Technique

An attempt was made to identify the major constraints faced by crossbred dairy cattle owners. The constraints are ranked by making use of Garrett's ranking technique. Garrett's method provides a robust quantitative approach to interpret qualitative ranking data, allowing researchers to draw meaningful insights into the constraints faced by crossbred dairy cattle owners (Garrett & Woodworth, 1969). In the present study, dairy cattle owners were asked to rank six constraints on a scale from I (most severe) to V (least severe). To standardize these subjective rankings, the following Garrett formula was used to estimate the percent position of each rank (Garrett & Woodworth, 1969).

$$\text{Percent Position} = \frac{100(R_{ij} - 0.5)}{N_j}$$

Where, R_{ij} = Rank given for the i th constraint by the j th respondent

N_j = Number of constraints ranked by the j th respondent

Then the estimated percent positions were converted into scores by referring to the table given by Garrett and Woodworth (1969). Then, for each constraint, the scores of each individual are added, and then the total value of scores and the mean values of scores are calculated. The preferences having highest mean value is considered to be the most severe constraint.

III. RESULT AND DISCUSSION

Garrett's ranking method is a valuable statistical tool used to analyse and interpret preference data, especially in agricultural studies where respondents rank constraints based on severity as perceived by the crossbred dairy cattle owners. Unlike simple frequency counts, this method converts ranks into scores using a standardized formula, allowing for more accurate comparisons across respondents. It helps eliminate bias from individual ranking patterns and provides a clear, quantifiable measure of severity-based ranking. The results of the study are presented in Tables 1 to 3. Table 1: Subjective rankings of constraints faced by crossbred dairy cattle owners

Sr.No	Constraint	Ranking of constraints faced by crossbred dairy cattle owners					
		I	II	III	IV	V	VI
1	Inadequate knowledge about stage-wise feeding management of dairy cattle	65	43	9	2	1	0
2	High cost of concentrate feed	43	51	22	4	0	0
3	Non-availability of green fodder throughout the year	11	19	57	22	10	1
4	Lack of knowledge on balanced feeding and minerals	0	5	18	50	50	8
5	Poor availability of quality fodder seeds	1	2	14	34	57	12

The data presented in Table 1 shows the subjective ranking of respondents for five major constraints related to scientific feeding management practices. The rankings range from I (most severe) to V (least severe), and the number of respondents assigning a rank to a constraint provides insight into its relative importance based on the severity of the constraints experienced in following scientific feeding management practices. Inadequate knowledge about cattle's stage-wise feeding management of dairy cattle was predominantly ranked I (65 respondents) and II (43 respondents), indicating that it was considered one of the most severe constraints faced by the respondents. High cost of concentrate feed was predominantly ranked II (51 respondents) and I (43 respondents), indicating that it was also consistently viewed as a major constraint. Non-availability of green fodder throughout the year was predominantly ranked III (57 respondents) and IV (22 respondents), showing that it was an important constraint related to fodder availability. Lack of knowledge about feeding and mineral supplementation was predominantly ranked IV (50 respondents) and V (50 respondents). Timely unavailability of quality fodder seeds was predominantly ranked V (57 respondents) and IV (34 respondents), indicating that it was considered a less severe constraint compared to the other major constraints. The ranking data provides a clear hierarchy of constraints faced by the respondents. These findings are critical for identifying the major difficulties faced by respondents and for developing suitable measures to improve scientific feeding management practices. However, as these rankings are subjective in nature, the Garrett values were determined using the Garrett ranking conversion table. To do this, the percentage positions were estimated along with their corresponding Garrett scores. For each constraint, the closest matching percentage position was identified from the table and the respective Garrett score was assigned accordingly (Table 2). Subsequently, rankings are allocated to different constraints according to the preferences of respondents, using the mean Garrett score as the basis for evaluation. This systematic approach ensures a precise and reliable ranking of constraints faced by the respondents in following scientific feeding management practices.

Table 2: Percent position and Garrett score of constraints faced by crossbred dairy cattle owners

Sr No	$100 \cdot (R_{ij} - 0.5) / N_j$	Per cent position	Garret score
1	$100 \cdot (1 - 0.5) / 5$	10.00	75
2	$100 \cdot (2 - 0.5) / 5$	30.00	60
3	$100 \cdot (3 - 0.5) / 5$	50.00	50
4	$100 \cdot (4 - 0.5) / 5$	70.00	40
5	$100 \cdot (5 - 0.5) / 5$	90.00	24

The average score and ranks of different constraints are depicted in table 3. The results highlight the constraints faced by crossbred dairy cattle owners in following scientific feeding management practices, with the inadequate knowledge about stage-wise feeding management of dairy cattle as the most severe constraint, ranked first with the highest mean score of 85.44. Following this, high cost of concentrate feed was ranked second with a mean score of 69.54. Similarly, non-availability of green fodder throughout the year was assigned rank III with a mean score of 65.45, while lack of knowledge about balanced feeds and mineral supplementation was recorded at rank IV with a mean score of 54.19. Timely unavailability of quality fodder seeds was ranked V with a mean score of 44.46. Inadequate knowledge about stage-wise feeding management may be an important constraint because proper feeding requirements vary according to the stage of the dairy cattle, affecting their health and milk production. High cost of concentrate feed may also influence the adoption of recommended feeding practices, particularly when feeding expenditure is high. Non-availability of green fodder throughout the year may create difficulties in maintaining a consistent fodder supply. Lack of knowledge on balanced feeding and mineral supplementation may further affect the proper nutritional management of dairy cattle. Timely unavailability of quality fodder seeds may limit the production of suitable fodder.

Table 3: Mean Garrett score and ranking of constraints faced by crossbred dairy cattle owners

Sr. No	Constraint	Ranking of constraints faced by crossbred dairy cattle owners						Mean score	Rank
		I	I I	I I I	I V	V	V I		
1	Inadequate knowledge about stage-wise feeding management of dairy cattle	65	43	9	2	1	0	72.86	I
2	High cost of concentrate feed	43	51	22	4	0	0	66.91	II
3	Non-availability of green fodder throughout the year	11	19	57	22	10	1	62.36	III
4	Lack of knowledge about feeding of balanced feeds and mineral supplements	0	5	18	50	50	8	49.18	IV
5	Timely unavailability of quality fodder seeds	1	2	14	34	57	12	35.88	V

IV. CONCLUSION

The application of Garrett's ranking method in evaluating constraints faced by crossbred dairy cattle

owners reveals a clear and data-driven hierarchy of difficulties. Based on the calculated Garrett values and mean scores, inadequate knowledge about stage-wise feeding management of dairy cattle emerged as the most important constraint, ranked first with the highest mean score of 72.86. Following this, high cost of concentrate feed was ranked second with a mean score of 66.91. Similarly, non-availability of green fodder throughout the year was assigned rank III, while lack of knowledge on balanced feeding and mineral supplementation was recorded at rank IV. Timely unavailability of quality fodder seeds was recorded at rank V. The results underscore the importance of addressing inadequate technical knowledge regarding stage-wise feeding management. Promoting awareness among farmers through Krishi Vigyan Kendra's (KVKs) and State Agricultural Universities (SAUs) about scientific feeding management practices can significantly help the crossbred dairy cattle owners to overcome this constraint.

REFERENCES

- [1] Akintan, O. A., Gebremedhin, K. G., & Uyeh, D. D. (2025). Linking animal feed formulation to milk quantity, quality, and animal health through data-driven decision-making. *Animals*, 15(2), Article 162. <https://doi.org/10.3390/ani15020162>
- [2] de Ondarza, M. B., & Tricarico, J. M. (2017). Review: Advantages and limitations of dairy efficiency measures and the effects of nutrition and feeding management interventions. *The Professional Animal Scientist*, 33(4), 393–400. <https://doi.org/10.15232/pas.2017-01624>
- [3] Department of Animal Husbandry and Dairying. (2019). 20th Livestock Census 2019: All-India report. Ministry of Fisheries, Animal Husbandry & Dairying, Government of India.
- [4] Department of Animal Husbandry and Dairying. (2025). Basic animal husbandry statistics 2024–25. Ministry of Fisheries, Animal Husbandry & Dairying, Government of India.
- [5] Dhamodharan, P., Bhuvaneshwari, J., Sowmiya, S., & Chinnadurai, R. (2024). Revitalizing fodder production: Challenges and opportunities. *International Journal of Research in Agronomy*, 7(1), 208–217. <https://doi.org/10.33545/2618060X.2024.v7.i1c.215>

- [6] Directorate of Economics and Statistics. (2025). Economic survey of Maharashtra 2025–26. Planning Department, Government of Maharashtra.
- [7] Garrett, H. E., & Woodworth, R. S. (1969). Statistics in psychology and education (6th ed.). Vakils, Feffer and Simons.
- [8] Gnanasekar, R., & Christy, R. J. (2017). Garrett's ranking analysis of various clinical bovine mastitis control constraints in Villupuram district of Tamil Nadu. *Journal of Livestock Science*, 8, 148–152.
- [9] Hundal, J. S., Kansal, S. K., Singh, U., & Kashyap, L. (2017). Constraints about dairy farming in central zone of Punjab by Garrett's ranking technique. *International Journal of Livestock Research*, 7(11), 215–219. <https://doi.org/10.5455/ijlr.20170823053805>
- [10] Kapadiya, P. S., Chaudhari, P. N., & Gadariya, M. R. (2022). Adoption level of scientific dairy management practices among livestock owners. *Gujarat Journal of Extension Education*, 33(2), 32–37.
- [11] Prajapati, V., Odedra, M., Gamit, V., Ahlawat, A., & Patel, H. (2021). An overview of feeding management practices followed by the dairy farmers in different states of India. *Journal of Entomology and Zoology Studies*, 9(1), 2248–2254.
- [12] Raj, K., & Ramachandra. (2022). Garrett scoring technique for assessing the constraints faced by dairy farmers of Madhepura district, Bihar. *Environment Conservation Journal*, 23(3), 335–341. <https://doi.org/10.36953/ecj.021967-2193>
- [13] Shinde, M. H., & Godbole, Y. (2024). Milk production in Ahmednagar District: Determinants of decline. *Economic & Political Weekly*, 59(13), 21–25.
- [14] Singh, S., & Hansra, B. S. (2025). Constraints faced by dairy farmers in the Kumaon region of Uttarakhand, India: An analytical study. *Asian Journal of Current Research*, 10(3), 20–24. <https://doi.org/10.56557/ajocr/2025/v10i39438>
- [15] Terefe, G., & Walelegne, M. (2024). Effect of feeds and hygienic practices on milk production and its nutritional and microbiological quality. *CABI Reviews*, 2024, Article 0017. <https://doi.org/10.1079/cabireviews.2024.0017>
- [16] Verma, D. N. (2005). A text book of livestock production (Management in tropic). Kalyani Publishers.
- [17] Verma, K., Singh, R., & Meena, H. R. (2022). Garrett's ranking analysis for constraints faced by dairy farmers in adoption of improved animal husbandry practices in central plain zone of Uttar Pradesh. *The Pharma Innovation Journal*, 11(9S), 1586–1589.