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Feeding management practices followed by indigenous khillar cattle owners

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Abstract

Agriculture and allied activities form the main source of livelihood for rural communities. Livestock, particularly cattle, contribute significantly to rural income and agricultural sustainability. Among the indigenous cattle breeds, Khillar holds a prominent place in the western regions of Maharashtra. The study on feeding management practices among indigenous Khillar cattle owners in Sangli and Solapur districts revealed a strong reliance on locally available fodder resources. Sorghum (95.75 per cent) and maize (93.75 per cent) were predominantly used as dry fodder, while green fodder sources included maize (79.37 per cent), sorghum (77.50 per cent), and Napier grass (66.87 per cent). A majority of farmers provided 3.1 to 4 kg of dry fodder and 10.1 to 15 kg of green roughage per animal daily. Concentrate feeding was widely practiced, with cottonseed cake (91.87 per cent) and groundnut cake (85.00 per cent) being common choices. About 79.37 per cent of respondents incorporated mineral supplements into the diet. Feeding practices such as manual chaffing (56.87 per cent), fodder soaking (50.00 per cent), and sprinkling jaggery water (68.75 per cent) were common. However, only 32.50 per cent adjusted feeding based on the animal's physiological stage. A combination of stall feeding and grazing was adopted by 71.87 per cent of farmers, and individual feeding was practiced by 88.12 per cent. All respondents ensured access to clean drinking water, primarily sourced from wells (61.87 per cent) and delivered via tanks (82.50 per cent). The findings underscore a blend of traditional and semi-improved feeding practices, with scope for enhancement through targeted advisory, training, and mechanization support.

Keywords: Indigenous Khillar cattle owners, Feeding management practices.

Introduction

India is predominantly an agricultural nation, with about 65.00 per cent of its population living in rural areas and relying on agriculture and allied activities, which are largely monsoon-dependent. Agriculture significantly contributes to the country's GDP and rural development, supported by sustainable practices, eco-friendly technologies, and effective natural resource management. Livestock has been integral to human society for centuries, providing economic, physical, and social benefits. India has a cattle population of 192.49 million (20th Livestock Census, 2019), including 142.11 million indigenous and 50.42 million exotic/crossbred cattle. Cattle play a crucial role in rural livelihoods, contributing to both agricultural productivity and household income. They are vital for poverty reduction and socio-economic development, especially for small and marginal farmers. The government promotes cattle conservation through initiatives such as the Rashtriya Gokul Mission, National Livestock Mission, and Livestock Health and Disease Control Programme. India's diverse indigenous breeds include the Khillar, a notable native breed with significant regional importance. The 20th livestock census indicated a 32.00 per cent decline in the number of Khillar bulls in the country, with a significant portion of this decline occurring in Maharashtra. In spite of these challenges, the Khillar cattle breed is still popular amongst the farmers of Maharashtra and particularly farmers from western Maharashtra. A large number of farmers continue to rear this Khillar cattle breed, due to the emotion and prestige associated with the breed, regardless of the introduction of cross breed cattle for milk yield and reduction of demand of Khillar bullocks for agricultural operations and draft purpose on account of mechanization. Therefore it is necessary to study feeding management practices followed by the farmers rearing the Khillar cattle breed and accordingly the present study on Feeding Management practices followed by indigenous Khillar cattle owners was conducted.

Methodology

The study was conducted in Sangli and Solapur districts of Maharashtra, the native breeding tracts of Khillar cattle. These drought-prone, rain-shadow regions were selected due to their large Khillar population, traditional rearing practices, and the breed's draught power, heat tolerance and disease resistance. In Sangli district, Atpadi and Jath talukas

were chosen for their reliance on Khillar cattle in agriculture and cultural activities, with open grazing and limited water sources. In Solapur district, Sangola and Pandharpur talukas were selected, representing diverse management systems, from semi-arid to irrigated areas, with both traditional and evolving practices. Purposive sampling was used to select study areas, followed by simple random sampling for respondents. From each of the four selected talukas, four villages were identified, and 10 Khillar cattle owners were randomly chosen per village, totaling 160 respondents. Care was taken to include variation in herd size, landholding, and socio-economic background, ensuring findings reflect regional characteristics and indigenous management practices in Maharashtra's dry zones.

Results and Discussion

Feeding management is a critical aspect of livestock rearing that directly influences the health, growth, and productivity of cattle. For indigenous Khillar cattle, proper feeding ensures better draught performance, disease resistance, and reproductive efficiency. The feeding practices followed by Khillar cattle owners are often based on locally available resources, traditional knowledge, and economic conditions. Studying these practices helps in understanding the nutritional adequacy, limitations, and scope for improvement in the feeding systems to enhance the overall performance of Khillar cattle.

The results of the feeding management practices followed by Khillar cattle owners are presented below.

Table 1: Feeding management practices followed by indigenous Khillar cattle owners

Sr. No.	Feeding management practices followed by indigenous Khillar cattle owners		Frequency (N=160)	Percentage
1.	Type of dry fodder	Rice Straw	00	00.00
		Wheat Straw	00	00.00
		Maize	150	93.75
		Sorghum	153	95.75
		Pearl millet	00	00.00
		Grass	00	00.00
2.	Dry Roughages (Kg /Day)	2 to 3	21	13.13
		3.1 to 4	103	64.37
		4.1 to 5	36	22.50
3.	Type of green fodder	Monocot		
		Anjan grass	39	24.37
		Maize	127	79.37
		Sorghum	124	77.50
		Napier grass	107	66.87
		Dicot		
		Berseem	00	00.00
		Lucerne	13	8.12
		Cowpea	23	14.37
		Silage	107	66.87
		Tubers/ Root crops	00	00.00
		Sugarcane tops	124	77.50
4.	Green roughages (Kg/Day)	6 to 10	13	8.13
		10.1 to 15	96	60.00
		15.1 to 20	44	27.50
		20.1 to 25	7	4.37
5.	Type of Concentrate			
	Grains	Maize	110	68.75
		Sorghum	124	77.50
		Pearl millet	00	00.00
		Moth bean	78	48.75
		Chickpea	71	44.37
	Energy rich food	Milled flour	56	35.00
		Rice Bran	00	00.00
		Wheat Bran	00	00.00
		Jaggery	121	75.62
	Protein Rich	Plant Based-		
		Groundnut Cake	136	85.00
		Soybean Cake	00	00.00
		Cotton Seed Cake	147	91.87
		Mustard Cake	00	00.00
		Safflower Cake	00	00.00
		Sesame Cake	00	00.00
		Animal Based-Milk/Eggs	48	30.00
		Gram Chunni	12	7.50
6.	Concentrate Kg/Day	Below 1	11	6.87
		1.1 to 2	37	23.13
		2.1 to 3	112	70.00

7	Supplement	Minerals	127	79.37
		Vitamins	85	53.12
8	Processed fodder			
	Processd dry fodder			
	Fodder chaffing	By machine	46	28.75
		Manual	91	56.87
		Not undertaking	23	14.37
	Soaking		80	50.00
	Sprinkling the salt water		34	21.25
	Sprinkling of jaggery water		110	68.75
	Urea treatment		16	10.00
9	Mixing of the dry and green fodder	Undertaken	120	75.00
		Not undertaken	40	25.00
10	Silage	Silage Prepared and used	29	18.13
		Silage Purchased and used	78	48.75
		Not used	53	33.12
11	Considering the stages of cattle while feeding	Milch cattle	23	14.37
		Dry cattle	10	6.25
		Pregnant	52	32.50
		Heifer	5	3.13
		Bull	38	23.75
		Breeding bull	20	12.50
		Bullock	12	7.50
12	Criteria to decide quantity of fodder	Milk yield	11	6.87
		Body weight of animal	28	17.50
		Quantity of green fodder available	46	28.75
		Stages of cattle	75	46.88
13	Method of grazing of Khillar cattle	Free grazing	00	00.00
		Pasture grazing	00	00.00
		Stall feeding	45	28.13
		Grazing + stall feeding	115	71.87
14	Method of feeding	Individual	141	88.12
		Group	19	11.88
15	Provision of clean water for drinking	Provided	160	100.00
		Not Provided	00	00.00
16	Water sources	Bore well	34	21.26
		Well	99	61.87
		Hand pump	27	16.87
17	Method of providing the drinking water	Bucket	28	17.50
		Tank	132	82.50
		Automated	00	00.00
18	Frequency of providing the drinking water	2 times	94	57.50
		3 times	32	20.00
		4 times	15	9.37
		Voluntary	19	11.88

1.1 Type of dry fodder

From the above table 1, it is observed that majority of the indigenous Khillar cattle owners used Maize (93.75 per cent) and Sorghum (95.75 per cent) as dry fodder. Other common options like rice straw, wheat straw, pearl millet, and grass were not used at all. This indicates a strong preference for locally grown, nutritious dry fodder, especially in regions where maize and sorghum are readily available.

1.2 Quantity of dry roughages per day

From table 1, it is revealed that more than half of the indigenous Khillar cattle owners (64.37 per cent) provided 3.1 to 4 kg/day**,** while 22.5 per cent gave 4.1 to 5 kg/day, and 13.13 per cent gave 2 to 3 kg/day of dry roughages per kg / day. This shows that most Khillar cattle owners are providing moderate amounts of roughage, likely based on affordability and availability.

1.3 Type of green fodder

From table 1, it was concluded that, most popular green fodders were Maize (79.37 per cent)**, S**orghum (77.5 per cent) and Napier grass (66.87 per cent)**.** A few also used Anjan grass (24.37 per cent)**,** Lucerne (8.12 per cent)**,** and Chavli (Cow pea) (14.37 per cent)**,** while dicots like Berseem and tuber/root crops were not used. Also, silage and sugarcane tops were commonly used (66.87 per cent and 77.5 per cent, respectively). This highlights a reliance on monocot-based green fodders and silage over legume-based options.

1.4 Quantity of green roughages per day

From table 1, it is concluded that more than half of the indigenous Khillar cattle owners (60.00 per cent) provided 10.1 to 15 kg/day, followed by 15.1 to 20 kg/day (27.5 per cent), and only 8.13 per cent gave 6 to 10 kg/day of green roughages per day**.** A very small number gave more than 20

kg green roughages per day. This shows that Khillar cattle owners are fairly regular in offering adequate green fodder, which is vital for milk production and overall health.

1.5. Type of concentrates

From the table 1, it is observed that, majority of the indigenous Khillar cattle owner used grain concentrates that included Sorghum (77.5 per cent), Maize (68.75 per cent), Moth bean (48.75 per cent), and Chickpea (44.37 per cent). Energy-rich feeds like Jaggery (75.62 per cent) and milled flour (35.00 per cent) were used, while rice bran and wheat bran were not used at all. In terms of protein, cottonseed cake (91.87 per cent) and groundnut cake (85 per cent) were dominant. Animal-based proteins (like milk/eggs) were used by 30.00 per cent of the indigenous Khillar cattle owners. This indicates that Khillar cattle owners emphasize protein-rich and energy-rich concentrates, especially from plant sources.

1.6 Quantity of concentrate per day

Majority of Khillar cattle owners (70.00 per cent) gave 2.1 to 3 kg/day, while 23.13 per cent gave 1.1 to 2 kg, and only 6.87 per cent gave less than 1 kg of concentrate per day This shows a good practice of providing sufficient concentrates to meet energy and protein demands, especially in lactating and working cattle.

1.7. Use of supplements

From table 1, it was concluded that majority of the indigenous Khillar cattle owners (79.37 per cent) and more than half of the Khillar cattle owners (53.12 per cent) were using a good portion of vitamins and minerals. This indicates growing awareness about the role of micro-nutrients in animal productivity and reproductive health.

1.8. Processed fodder practices

From table 1, it was concluded that more than half of the of indigenous Khillar cattle owners (56.87 per cent) chaffed fodder manually, while 28.75 per cent of them used machines. Soaking of fodder (50.00 per cent) and sprinkling Jaggery water (68.75 per cent) were more popular than saltwater sprinkling (21.25 per cent). However, only 10 per cent practiced urea treatment, showing limited scientific processing. Manual methods still dominate due to affordability and accessibility.

1.9 Mixing of dry and green fodder

Majority of the indigenous Khillar cattle owners (75.00 per cent) practiced mixing of dry and green fodders, showing an understanding of balanced nutrition and better digestibility. This is a positive feeding behaviour.

1.10. Use of Silage

From the table 1, it is revealed that 48.75 per cent indigenous Khillar cattle owners purchased silage and 18.13 per cent prepared their own, around 33.12 per cent did not use silage. This shows that silage is gaining popularity but still needs more awareness and training for on-farm preparation.

1.11. Considering the stages of cattle while feeding

From table 1, it was observed that 32.50 per cent of the indigenous Khillar cattle owners tailored feed for pregnant cattle, while very few considered milk cattle (14.37 per cent), bulls (23.75 per cent), or heifers (3.13 per cent). This shows that stage-specific feeding is still not widely practiced and requires greater emphasis in training program

1.12. Criteria for deciding fodder quantity

From table 1, it is observed that most Khillar cattle owners (46.88 per cent) based fodder quantity on the stage of the animal, followed by availability of green fodder (28.75 per cent), body weight (17.5 per cent), and milk yield (6.87 per cent). While many are considering proper criteria, a majority still rely on visual judgment rather than accurate nutritional planning.

1.13. Method of grazing

From above table 1, it was observed that 71.87 per cent of the indigenous Khillar cattle owners used a combined system of grazing and stall feeding, while 28.13 per cent used only stall feeding. This shows that most of the indigenous Khillar cattle owners are moving toward semi-intensive systems, which allow better control of nutrition.

1.14. Method of feeding

Majority of the indigenous Khillar cattle owners (88.12 per cent) fed cattle individually, showing good feeding discipline and control. Only 11.88 per cent followed group feeding, which is often less effective for managing individual intake and special needs. However, group feeding is advisable, possible and convenient in loose housing system.

1.15 Provision of clean water

From table 1, it was revealed that all Khillar cattle owners (100.00 per cent) provided clean drinking water, which is crucial for health, digestion, and milk production. This reflects excellent awareness and basic hygiene in livestock management.

1.16 Source of water

Most Khillar cattle owners depended on wells (61.87 per cent), followed by bore wells (21.26 per cent) and hand pumps (16.87 per cent), showing a strong reliance on traditional water sources in rural areas.

1.17 Method of providing drinking water

From table 1, it was observed that majority of the Khillar cattle owners (82.50 per cent) used water tanks, while 17.50 per cent used buckets. No one used automated systems, which indicates manual methods are still the norm due to cost and infrastructure limitations.

1.18. Frequency of providing drinking water

From table 1, it was observed that more than half of the Khillar cattle owners watered animals twice a day (57.5 per cent), some did it thrice (20.00 per cent) and some did four times (9.37 per cent), and a few allowed voluntary drinking (11.88 per cent). While the majority meet minimum water needs, more frequent or on-demand access could further improve animal health.

Conclusion

The study provides comprehensive insights into the feeding management practices of indigenous Khillar cattle owners in

Sangli and Solapur districts. Most farmers (95.75 per cent) used sorghum, while 93.75 per cent relied on maize as the primary dry fodder for their cattle. Approximately 64.37 per cent of farmers fed their cattle between 3.1 to 4 kg of dry roughage daily. For green fodder, maize (79.37 per cent), sorghum (77.50 per cent), and Napier grass (66.87 per cent) were the most common sources, with 60.00 per cent of farmers providing between 10.1 to 15 kg of green roughages daily. Concentrates, such as cottonseed cake (91.87 per cent) and groundnut cake (85.00 per cent), were commonly provided, with 70.00 per cent of farmers offering 2.1 to 3 kg of concentrate per animal each day. A significant majority (79.37 per cent) also used mineral supplements as part of their cattle feeding practices. Additionally, farmers employed various processed fodder techniques; including manual chaffing (56.87 per cent), soaking (50.00 per cent), and sprinkling jaggery water (68.75 per cent). Moreover, 75.00 per cent of the respondents mixed dry and green fodder before feeding, and 48.75 per cent purchased and used silage. While 32.50 per cent of farmers adjusted their feeding based on the physiological stage of the animal (such as pregnancy or lactation), a larger portion (46.88 per cent) based the fodder quantity on the animal's stage of production, while others relied on fodder availability. A majority of farmers (71.87 per cent) adopted a combination of grazing and stall feeding, and 88.12 per cent practiced individual feeding. Importantly, all respondents (100.00 per cent) ensured their cattle had access to clean drinking water, primarily sourced from wells (61.87 per cent), bore wells, and hand pumps. Water was provided using tanks by 82.50 per cent of the farmers, with 57.50 per cent of them watering their cattle twice a day. Overall, the study shows that the feeding practices of Khillar cattle owners are largely traditional, with some adoption of modern feeding practices like concentrate feeding, mineral supplements, and processed fodder techniques. However, there is significant room for improvement in feeding strategies that account for the animal's physiological needs and the broader adoption of more modern methods to enhance the nutrition and health of the cattle.

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