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Replacement of Berseem Green Fodder by Moringa (*Moringa oleifera*) Leaves and Its Feeding Effect on Actual Feed Intake and Cost of Feeding in growing calves

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Abstract

The present investigation was conducted at Livestock Instructional farm, Department of Animal Husbandry and Dairy science, Dr. PDKV, Akola during 2025-2026. During the investigation, eighteen growing calves were divided into three groups based on nearness of the age and average body weight. The treatment was planned as T₁ Dry roughages (*ad lib*) + Green roughages (50% Hybrid napier + 50% Berseem) + concentrate, T₂ Dry roughages (*ad lib*) + Green roughages (50% Hybrid napier + 40% Berseem + 10% Moringa tree leaves) + concentrate, T₃ Dry roughages (*ad lib*) + Green roughages (50% Hybrid napier + 30% Berseem + 20% Moringa Leaves) + Concentrate. The calves from T₃ (4.10) group consumed more feed intake than that of T₁ (3.95) and T₂ (4.00) kg/calf respectively. The Daily feed intake per 100 kg body weight of calf was 5.34, 5.53, 5.39 kg/day/calf for T₁, T₂ and T₃ respectively. The total feed cost highest in T₃ group (Rs. 15,768), followed by T₁ (Rs. 15,750) and T₂ (Rs. 15,732) groups. The feed cost per day per calf was Rs. 21.90, Rs. 21.87 and Rs. 21.85 under T₃, T₁ and T₂, respectively. The lowest daily feeding cost was observed in T₂, while the highest was recorded in T₃.

Keywords: Moringa leaves, Growing calves, chemical composition, actual feed intake, feed cost structure

1. Introduction

India is an agriculture-based developing country, where livestock forms an essential component of the agricultural sector. Nearly 70 Per cent of the population depends on agriculture for their livelihood. Livestock significantly supports the rural economy and agricultural activities. As per the 20th Livestock Census, the total livestock population in India was 535.78 million, representing a 4.6% increase compared to the 2012 census. This includes 192.49 million cattle and 109.85 million buffaloes. The livestock sector contributes approximately 30.19% to the overall agricultural output of the country. (20th Livestock Census)

Because of its numerous uses and beneficial properties, *Moringa oleifera* is commonly known as the “miracle tree” or “multipurpose tree” (Koul and Chase, 2015) [7]. It is widely recognized as an important fodder species and has substantial potential as a browse resource for supplementing the diets of ruminant animals. The plant is also considered highly suitable for agroforestry systems due to its diverse applications and adaptability. *Moringa oleifera* leaves are considered an economical and nutritionally valuable alternative to conventional feed resources, offering a potential means of reducing the limitations and costs associated with traditional livestock feeds. Their relatively low cost of production can help decrease feeding expenditures while supporting livestock growth and productivity (Kholif *et al.*, 2016) [6].

Materials and Methods

Selection of experimental calves

The present investigation entitled “Replacement of Berseem Green Fodder by Moringa

(*Moringa oleifera*) Leaves and Its Feeding Effect on Actual Feed Intake and Cost of Feeding in growing calves” was undertaken at Livestock Instructional Farm, Department of Animal Husbandry and Dairy Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the year 2025-2026 for a period of 120 days. Eighteen growing calves between the age group of 6 to 12 months were selected randomly from the herd, according to nearness to the age and body weight. The calves were divided into three groups having six calves selected in each group. The experiment was undertaken in RBD (Randomized block design) with 3 treatment and 6 replications. The feeding treatment consists T₁-Dry roughages (*ad lib.*) + Green roughages (50% Hybrid Napier + 50% Berseem) + Concentrate, T₂-Dry roughages (*ad lib.*) + Green roughages (50% Hybrid Napier + 40% Berseem + 10% Moringa tree leaves) + Concentrate, T₃-Dry roughages (*ad lib.*) + Green roughages (50% Hybrid Napier + 30% Berseem + 20% Moringa tree leaves) + Concentrate. In all treatments, green roughages and concentrates are provided on the basis of the body weight of the growing calves as per thumb rule.

Actual feed intake

The daily feed consumption of the calves was recorded twice in a week to access the dry matter consumption by individual animals in different treatments. The calves were given a known quality of concentrates. Dry roughages *ad lib* (soybean straw), Hybrid napier, Berseem and Moringa leaves.

Cost structure

The prices of different constituents of feed stuff approved at the university rates were considered for calculation per kg of feed.

Statistical analysis

The obtained data was statistically analyzed by Randomized block design (RBD) (Amble 1995)^[4].

Results and Discussion

Proximate Analysis of feedstuff

The data obtained on the proximate composition of different feedstuffs with respect to DM, CP, CF, EE, NFE and ash are presented in Table 1.

Table 1: Average proximate composition of different feedstuffs (% DM basis)

Particulars	DM	CP	CF	EE	NFE	Ash
Soybean straw	88.08	5.87	41.86	3.35	40.02	8.90
Hybrid Napier	28.65	8.79	25.98	2.42	52.56	10.25
Berseem	20.35	18.98	23.12	2.95	43.15	11.80
Moringa leaves	29.10	24.87	13.56	5.23	46.22	10.12
Concentrate	90.15	18.25	11.84	6.55	59.38	3.98

Actual feed intake

The data obtained in respect to Average Daily Feed intake and

Daily Feed intake /100 kg body weight of growing calves was statistically analysed and Presented in Table 2.

Table 2: Average daily feed intake and daily feed intake / 100 kg body weight of growing calves under different treatments

Treatments	Average body weight (kg) during the experimental period	Daily feed intake (kg)/calf	Daily feed intake/100 Kg BW
T ₁	73.86	3.95	5.34
T ₂	72.30	4.00	5.53
T ₃	76.02	4.10	5.39
'F' Test	Sig.	Sig.	Sig.
SE(M) ±	0.42	0.02	0.02
CD at 5%	1.31	0.05	0.06

It was evident from Table 2 that the calves having average body weights of 73.86, 72.30 and 76.02 kg consumed 3.95, 4.00 and 4.10 kg feed per day in treatments T₁, T₂ and T₃, respectively. The daily feed intake per 100 kg body weight was 5.34, 5.53 and 5.39 kg in T₁, T₂ and T₃, respectively. The variation in feed intake among the treatment groups indicated that the calves consumed sufficient quantities of feed throughout the experimental period. Inclusion of Moringa tree leaves in the diet showed a positive effect on feed intake. The highest daily feed intake was recorded in T₃ (4.10 kg), followed by T₂ (4.00 kg) and T₁ (3.95 kg), suggesting that Moringa leaf supplementation may have enhanced feed consumption in growing calves.

Mendieta-Araica *et al.* (2011), who reported that there were no significant differences among treatments with regard to feed intake when Moringa leaf meal was fed to cows.

Reyes *et al.* (2006) observed an increase in DMI (8.5 vs 10.2 vs 11.0 kg DM/day) with the supplementation of 2.0 kg and 3.0 kg DM of Moringa, respectively, as compared to control. Abdel and Hassan (2021) studied Moringa leaf meal in growing buffalo calves. They reported that 15% Moringa leaf meal significantly improved total dry matter intake, while also improving body-weight gain and feed conversion efficiency. This is particularly relevant to your calf study because the animals were growing buffalo calves.

Feed cost structure of different Feeding Groups

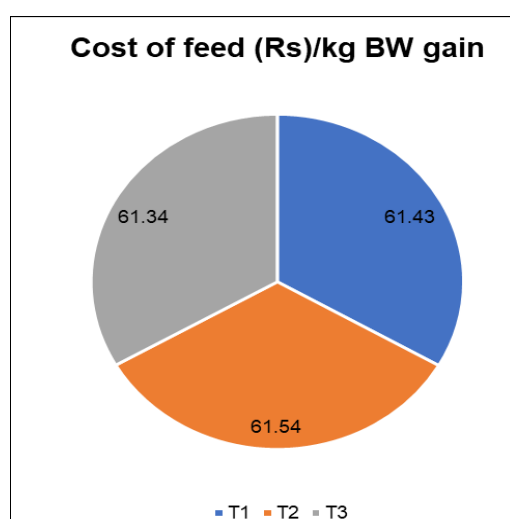
The cost of different feedstuffs used in the experimental diets, namely soybean straw, hybrid Napier, berseem, Moringa leaves and concentrate mixture was calculated to determine the total feed cost, daily feed cost per calf and cost of feed per kg body weight gain under different treatments.

Table 3: Feed Cost structure of different feeding groups

Sr No	Treatments	T ₁		T ₂		T ₃	
	Particulars	Qty. (kg)	Cost (Rs)	Qty. (kg)	Cost (Rs)	Qty. (kg)	Cost (Rs)
	I) Avg. feed required						
A)	Soybean straw (kg) @150 Rs/qt	900	1350	936	1404	1008	1512
B)	Hybrid Napier(kg) @ 100 Rs/qt	720	720	720	720	720	720
C)	Berseem(kg) @1.50 Rs/kg	720	1080	576	864	432	648
D)	Moringa leaves (kg) @1.00 Rs/qt	-	-	144	144	288	288
E)	Concentrate mix (calves ration) @ 2500 Rs /qt	504	12,600	504	12,600	504	12,600
II)	Total feed cost/ treatment / 6 calves (Rs)	15,750		15,732		15,768	
III)	Feed cost (Rs) / day / calf	21.87		21.85		21.90	
IV)	Total body weight gain/calf /day (kg)	0.356		0.355		0.357	
V)	Cost of feed (Rs) / kg BW gain	61.43		61.54		61.34	

The total feed cost observed from the table 3 indicated that it was highest in T₃ group (Rs. 15,768), followed by T₁ (Rs. 15,750) and T₂ (Rs. 15,732) groups. The feed cost per day per calf was Rs. 21.90, Rs. 21.87 and Rs. 21.85 under T₃, T₁ and T₂ respectively. Thus, the lowest daily feeding cost was observed in T₂, while the highest was recorded in T₃.

The average body weight gain per calf per day was 0.356, 0.355 and 0.357 kg in T₁, T₂ and T₃ respectively. The highest daily body weight gain was observed in T₃, followed by T₁ and T₂. The cost of feed per kg body weight gain was Rs. 61.43, Rs. 61.54 and Rs. 61.34 in T₁, T₂ and T₃, respectively. The cost per kg body weight gain was lowest in T₃, followed by T₁ and T₂. This indicates that, although the total feed cost was slightly higher in T₃, the higher body weight gain resulted in a lower cost per kg body weight gain, making T₃ the most economical treatment among the three feeding groups.



Aharwal *et al.* (2019) [3] reported that replacing 5 and 15 per cent of calf starter with *Moringa oleifera* leaf meal in Murrah buffalo calves reduced rearing costs and improved economic efficiency. The recurring expenditure per kg body weight gain was ₹322.27, ₹269.35 and ₹262.15 in the control, M5 and M15 groups, respectively. They concluded that Moringa leaf meal could replace up to 15 per cent of calf starter without adversely affecting growth performance.

Sharma *et al.* (2023) [10] reported that replacing 50 per cent of calf starter protein with *Moringa oleifera* leaves in the diet of crossbred calves maintained comparable growth performance and feed conversion efficiency. However, the cost per kg body weight gain was 6.26 per cent higher in the Moringa-fed calves.

Bhingarde *et al.* (2025) [5] reported that inclusion of Moringa

leaf meal at 0, 10, 15 and 20 per cent levels in homemade concentrate mixtures improved growth performance and feed cost efficiency in Deoni calves. The lowest feed cost per kg body weight gain (₹174.08) was recorded at 20 per cent Moringa inclusion, indicating the most favourable economic response.

Conclusion

From the above study, it is concluded that daily feed intake of the growing calves was differing significantly between the feeding groups. The results revealed that partial substitution of berseem with Moringa leaves up to 20 per cent was readily accepted by the calves and did not adversely affect their feed intake. The maximum feed consumption was recorded in T₃ (4.10 kg/day), indicating that inclusion of Moringa leaves at 20 per cent may enhance the palatability of the ration and improve its overall nutrient balance. The partial replacement of berseem with 20 per cent Moringa leaves (T₃) showed an increase in actual feed intake (4.10 kg). The inclusion of 20 per cent Moringa leaves appears most economical on the basis of a lower feed cost (Rs. 61.34) required to achieve 1 kg of body weight gain as compared to the cost of other treatments.

Conflict of Interest

Not available

Financial Support

Not available

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