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Effect of supplementation of fodder cactus (*Opuntia ficus indica*) on growth performance of growing calves

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Abstract

A 90-day feeding trial was conducted to evaluate the effect of fodder cactus (*Opuntia ficus indica*) supplementation on feed intake and growth performance of growing calves. Twenty growing calves were randomly allocated to four dietary treatment groups (T₁, T₂, T₃ and T₄), comprising five calves per group. All calves received a basal diet consisting of dry roughage, green fodder (Hybrid Napier and Berseem) and concentrate mixture. Fodder cactus was supplemented at 0, 200, 300 and 400 g/calf/day in T₁, T₂, T₃ and T₄, respectively. Average daily feed intake was 3.315, 3.675, 4.040 and 4.100 kg/calf in T₁, T₂, T₃ and T₄, respectively. Total body-weight gain was 24.30, 26.55, 28.35 and 27.00 kg/calf, while average daily gain was 0.270, 0.295, 0.315 and 0.300 kg/calf/day, respectively. The highest body-weight gain and average daily gain were recorded in T₃. Improvements in body measurements were also observed, with T₄ showing the highest gains in body length (10.02 cm), chest girth (10.06 cm) and body height (9.85 cm). Overall, fodder cactus supplementation improved feed intake and growth performance, with 300 g/calf/day providing the optimum response for body-weight gain and average daily gain.

Keywords: Fodder cactus, *Opuntia ficus indica*, growing calves, feed intake, body-weight gain, average daily gain, growth performance

1. Introduction

Livestock production plays an important role in the agricultural economy and contributes significantly to the livelihood of rural households. Adequate availability of quality feed and fodder is essential for maintaining livestock productivity. However, shortage of green fodder, particularly during dry and summer seasons, is a major constraint in many regions. The problem is more severe in dry and semi-arid areas where rainfall is uncertain and water resources are limited. Therefore, the use of drought-tolerant forage resources that can provide moisture and nutrients during periods of fodder scarcity is important for sustainable livestock production.

Fodder cactus (*Opuntia ficus indica*) is a drought-tolerant forage crop with considerable potential for livestock feeding in water-limited regions. It contains high moisture content along with readily available carbohydrates and minerals and can remain available when conventional green fodder is scarce. Thakuria *et al.* (2020)^[8] reported that spineless cactus could serve as an alternative forage because of its adaptability to dry conditions and high moisture content. Kumar *et al.* (2021)^[4] also reported the potential of cactus pear as an alternative forage resource in semi-arid regions of India. Further, Shruthilaya *et al.* (2022)^[7] observed that inclusion of spineless cactus in diets of growing Nellore lambs did not adversely affect growth performance, while Raut *et al.* (2025)^[6] reported favourable effects on feed consumption and growth performance of crossbred heifers supplemented with forage cactus.

Growing calves require sufficient nutrients for proper body development and efficient weight gain. Feed intake is an important factor influencing nutrient availability, while body weight and body measurements are useful indicators of growth performance. Considering the potential of fodder cactus as an alternative supplementary forage, the present study was undertaken to evaluate the effect of graded supplementation of fodder cactus (*Opuntia ficus indica*) on feed intake and growth performance of growing calves.

2. Materials and Methods

2.1 Experimental Site

The experiment was conducted at the Livestock Instructional Farm, Department of Animal Husbandry and Dairy Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra. The feeding experiment was conducted for 90 days.

2.3 Experimental Treatments

The dietary treatments were as follows

Table 1: Treatment groups and dietary treatments

Treatment	Treatment Details
T ₁	Dry roughages (ad lib) + 2 Kg green roughages (50% hybrid napier + 50% Berseem/lucerne) concentrate
T ₂	Basal ration + 200 g fodder
T ₃	Basal ration + 300 g fodder
T ₄	Basal ration + 400 g fodder

Dry roughages were offered ad libitum. Green fodder was supplied at 2 kg/calf/day, consisting of 50 per cent Hybrid Napier and 50 per cent Berseem/Lucerne. Concentrate mixture was supplied according to the feeding schedule and body weight of the calves.

2.4 Measurement of Growth Performance

Body weight of each calf was recorded at the beginning and end of the experiment. The total body weight gain was calculated as the difference between final and initial body weight. Average daily gain was calculated by dividing total body weight gain by the number of experimental days.

The following body measurements were recorded:

- Body length
- Chest girth

2.2 Experimental Animals and Design

Twenty healthy indigenous growing calves of nearly similar body weight were selected for the experiment. The calves were divided into four treatment groups containing five calves in each group. The animals were randomly allotted to the treatments following a Randomized Block Design.

The average initial body weight of calves in T₁, T₂, T₃ and T₄ was 52.46, 52.56, 53.30 and 54.02 kg, respectively.

- Body height

2.5 Statistical Analysis

The experimental data were statistically analysed using the Randomized Block Design. Treatment means were compared using the appropriate critical difference at the 5 per cent level of significance following the methods described by Amble (1975) ^[1].

3. Result and Discussion

3.1 Effect of fodder Cactus Supplementation on Body Weight

The effect of different levels of fodder cactus supplementation on body weight of growing calves is presented in Table 2.

Table 2: Effect of fodder cactus supplementation on body weight of growing calves

Treatments	Initial body weight (kg)	Final body weight (kg)	Total body weight gain (kg) during the experimental period	Weight gain/day/calf (kg)
T ₁	52.46	76.76	24.30	0.270
T ₂	52.56	79.11	26.55	0.295
T ₃	53.30	81.65	28.35	0.315
T ₄	54.02	81.02	27.00	0.300

The initial body weight of calves ranged from 52.46 to 54.02 kg and was statistically similar among the treatment groups. At the end of the experimental period, body weight increased to 76.76, 79.11, 81.65 and 81.02 kg in T₁, T₂, T₃ and T₄, respectively. Total body weight gain was 24.30, 26.55, 28.35 and 27.00 kg/calf, respectively, with the highest gain recorded in T₃. Similarly, average daily gain was highest in T₃ (0.315 kg/day), followed by T₄ (0.300 kg/day), T₂ (0.295 kg/day) and T₁ (0.270 kg/day). The improved growth in cactus-supplemented calves may be related to the nutrients and moisture supplied by fodder cactus, which may have supported better feed utilization. These findings are

comparable with those of Moshidi *et al.* (2025) ^[5] and Kumar *et al.* (2017) ^[3], who reported differences in body weight gain and average daily gain among calves receiving different dietary treatments. Overall, supplementation of 300 g fodder cactus/calf/day (T₃) resulted in the highest body weight gain and average daily gain.

3.2 Effect of Fodder Cactus Supplementation on Body Length

The average body length of calves under different treatments is presented in Table 3.

Table 3: Effect of fodder cactus supplementation on body length of growing calves

Treatments	Initial body length (cm)	Final body length (cm)	Total body length gain (cm) during the experimental period
T ₁	54.20	63.55	9.35
T ₂	54.80	64.30	9.50
T ₃	55.50	65.35	9.85
T ₄	56.60	66.62	10.02

The initial body length of calves was 54.20, 54.80, 55.50 and 56.60 cm in T₁, T₂, T₃ and T₄, respectively, at the end of the experimental period, body length increased to 63.55, 64.30, 65.35 and 66.62 cm, respectively. The gain in body length was 9.35, 9.50, 9.85 and 10.02 cm in T₁, T₂, T₃ and T₄, respectively, with the highest gain observed in T₄, followed by T₃, T₂ and T₁.

The gradual improvement in body length with increasing levels of fodder cactus supplementation indicates a positive effect on the growth of calves. This response may be due to the additional nutrients provided by fodder cactus, which

could have supported better growth and skeletal development. Similar results were reported by Raut *et al.* (2025) ^[6], who observed significant differences in final body length and body length gain in crossbred heifers fed different levels of forage cactus. The present findings suggest that fodder cactus supplementation can contribute to improved body length development in growing calves.

3.3 Effect of fodder cactus supplementation on chest girth

The effect of fodder cactus supplementation on chest girth is presented in Table 4.

Table 4: Effect of fodder cactus supplementation on chest girth of growing calves

Treatments	Initial chest girth (cm)	Final chest girth (cm)	Total chest girth gain (cm) during the experimental period
T ₁	64.65	74.0	9.35
T ₂	65.50	75.08	9.58
T ₃	66.25	76.12	9.87
T ₄	67.05	77.11	10.06

The initial chest girth of calves was 64.65, 65.50, 66.25 and 67.05 cm in T₁, T₂, T₃ and T₄, respectively, at the end of the experimental period, chest girth increased to 74.00, 75.08, 76.12 and 77.11 cm, respectively. The corresponding gain in chest girth was 9.35, 9.58, 9.87 and 10.06 cm in T₁, T₂, T₃ and T₄, respectively. The highest gain was recorded in T₄, followed by T₃, T₂ and T₁.

The gradual increase in chest girth with cactus supplementation indicates a positive effect on overall body development of the calves. This improvement may be associated with the better nutrient supply from fodder cactus,

which supported growth during the experimental period. Similar findings were reported by Raut *et al.* (2025) ^[6], who observed significant differences in chest girth gain among heifers fed different levels of forage cactus. The present results therefore suggest that fodder cactus supplementation can contribute to better body development in growing calves.

3.4 Effect of Fodder Cactus Supplementation on Body Height

The effect of different levels of fodder cactus on body height is presented in Table 5.

Table 5: Effect of fodder cactus supplementation on body height of growing calves

Treatments	Initial body height (cm)	Final body height (cm)	Total body height gain (cm) during the experimental period
T ₁	59.40	68.50	9.10
T ₂	60.15	69.42	9.27
T ₃	61.30	70.72	9.42
T ₄	62.50	72.35	9.85

The initial body height of calves was 59.40, 60.15, 61.30 and 62.50 cm in T₁, T₂, T₃ and T₄, respectively, at the end of the experimental period, body height increased to 68.50, 69.42, 70.72 and 72.35 cm, respectively. The corresponding gain in body height was 9.10, 9.27, 9.42 and 9.85 cm, with the highest gain recorded in T₄, followed by T₃, T₂ and T₁.

The gradual increase in body height with increasing levels of fodder cactus supplementation indicates better physical growth of the calves. This improvement may be due to the additional nutrients supplied by fodder cactus, which supported normal growth and development. Similar findings were reported by Raut *et al.* (2025) ^[6], who observed improved body height gain in heifers supplemented with forage cactus. The present results suggest that fodder cactus can contribute positively to the physical development of growing calves.

4. Overall Discussion

The present study showed that fodder cactus supplementation had a positive effect on the growth and body development of growing calves. The highest body weight gain and average daily gain were recorded in T₃ (300 g fodder cactus/calf/day), where total body weight gain increased from 24.30 kg in the control group to 28.35 kg. This improvement may be due to the nutrients and high moisture content of fodder cactus,

which may have helped improve feed utilization and support growth. Thakuria *et al.* (2020) ^[8] also reported that *Opuntia ficus indica* can be used as an alternative forage, particularly during dry periods and fodder shortages.

The body measurements showed a better response at the higher supplementation level. The highest gains in body length, chest girth and body height were recorded in T₄ (400 g fodder cactus/calf/day). Similar improvements in body measurements were reported by Raut *et al.* (2025) ^[6], while Moshidi *et al.* (2025) ^[5] observed positive effects of prickly pear supplementation on growth performance and average daily gain in dairy calves. Overall, 300 g fodder cactus/calf/day was more favourable for body weight gain, whereas 400 g/calf/day resulted in greater gains in body measurements.

5. Conclusion

The present study showed that supplementation of fodder cactus (*Opuntia ficus indica*) improved the growth performance and body development of growing calves. Calves receiving 300 g fodder cactus/calf/day (T₃) recorded the highest total body weight gain (28.35 kg/calf) and average daily gain (0.315 kg/day). However, the highest gains in body length (10.02 cm), chest girth (10.06 cm) and body height (9.85 cm) were observed in calves supplemented with 400

g/calf/day (T₄). Overall, the results indicate that fodder cactus can be used as a supplementary feed for growing calves. Under the conditions of the present study, 300 g fodder cactus/calf/day was the most suitable level for improving body weight gain and growth performance.

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Author's Contribution

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Conflict of Interest

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