



ISSN: 2456-2912

VET 2024; 9(5): 804-807

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www.veterinarypaper.com

Received: 18-08-2024

Accepted: 27-09-2024

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Study on feeding combination of maize silage (*Zea mays* L.) and berseem (*Trifolium alexandrinum*) on growth performance of crossbred growing calves

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Abstract

An investigation was carried at Livestock Instructional Farm, Department of Animal Husbandry and Dairy Science Dr. P.D.K.V. Akola during 2023-2024. During the investigation, twenty crossbred calves were replicated into four replications based on the age and average body weight. The treatment T1 having 100% maize silage, T2 having 90% maize silage + 10% berseem, T3 having 80% maize silage + 20% berseem, T4 having 70% maize silage + 30% berseem and T5 having 60% maize silage + 40% berseem. The feeding of concentrate and soyabean straw (adlib.) were common to all during the whole investigation. In all the treatments, treatment T5 is the best in terms of body weight gain and overall gain in body measurements (chest girth, body length, body height) and also shown significant improvement in dry matter intake (DMI) and DMI/100 Kg of body weight gain. Treatment T5 shows significant statistical results.

Keywords: Berseem, maize silage, dry matter intake, body measurements, crossbred growing calves

1. Introduction

India's livestock industry is indeed a vital part of the rural economy, supporting numerous families and providing valuable employment opportunities. The cattle industry alone contributes significantly to the national GDP, accounting for 5.50% of the total, and a substantial 30.23% of the agricultural GDP (BAHS 2023) [3]. India is among the fastest-growing economies globally, and to achieve the ambitious goal of becoming a developed nation by 2047, it is essential to strengthen its economic pillars. Among these pillars, animal husbandry and dairying is crucial component in bolstering India's economy. According to the 20th Livestock Census of 2019 [1], Maharashtra had a total bovine population of 19.50 million, which included 5.60 million buffaloes (5.10% of India's total buffalo population of 109.9 million) and 13.90 million cattle (7.22% of India's total cattle population of 192.5 million). There is decline in the cattle population of Maharashtra by 10.07 percent compare to 19th livestock census 2012. World is facing the challenge of climate change and India is also facing the same. Maharashtra's Vidarbha region has semi-arid, and hot summer conditions. During summer season, these conditions are very challenging to feed the animal and utilize maximum production from them. So, there is a need of proper management of feed and use of feed with the best nutritive value. Berseem (*Trifolium alexandrinum* L.) is a key winter fodder crop in India, legume is known for its palatable green foliage, which remains soft and succulent throughout its growth, containing approximately 20% crude protein, 62% total digestible nutrients (TDN), 35-38% acid detergent fibre (ADF), 24-25% cellulose, and 7-10% hemicelluloses, along with high levels of calcium and phosphorus, which enhance the milk production capacity of livestock. (Pal M.S. et al.2023) [6]. Maize silage (*Zea mays* L.) is also a highly palatable feed and loved by all animals, and maize having high amount of sugar which makes it best ensiling feedstuff. Maize silage has high amount of energy content and also high amount of crude fibre (Sarubbi F. et al. 2014) [7].

2. Materials and Methods

The present investigation carried out on “Study on feeding combination of maize silage (*Zea mays* L.) and berseem (*Trifolium alexandrinum*) on growth performance of crossbred growing calves.” Materials used and methods adopted are described in this chapter. The present investigation was carried out during 2023-24 at Livestock Instructional Farm, Department of Animal Husbandry and Dairy Science, Dr. P.D.K.V. Akola, Maharashtra, India. The experiment was undertaken in RBD (Randomized Block Design) with five treatments and four replications. In this experiment twenty crossbred growing calves were selected and randomly divided into five groups of four in each group on the basis of nearness of age and body weight. The feeding treatment consisted T1 (100% maize silage), T2 (90% maize silage + 10% berseem), T3 (80% maize silage + 20% berseem), T4 (70% maize silage + 30% berseem), and T5 (60% maize silage + 40% berseem). Feeding of soybean straw (ad.lib). + concentrates were common to all the groups with four replications and are provided as per the “Thumb rule of feeding.”

2.1 Dry Matter Intake

DMI was recorded per calf on daily basis by using standard methods.

2.2 Body weight gain

The body weight gain includes daily weight and total body weight gain of crossbred growing calves when supplemented with maize silage and berseem in different combinations.

2.3 Body measurements

Body measurements such as chest girth, body length, and body height were recorded for all the calves on individual basis. The standard procedure was adopted for determining all the body measurements.

3. Results and Discussion

3.1 Dry matter intake

It was revealed from Table no.1 and fig no.1, that the average daily dry matter intake was 1.65, 1.80, 1.90, 2.23 and 2.27 kg/day/calf in T1, T2, T3, T4 and T5 treatments, respectively for calves of average was 63.718, 66.050, 68.388, 68.698 and 71.234 kg, respectively under treatment T1, T2, T3, T4 and T5 treatments respectively. The current intake values are comparable to those reported by past researchers. Specifically, Das *et al.* (2012) [4] noted that the average daily dry matter intake was highest in treatment T2, with recorded values of 5.89 kg for T1, 6.34 kg for T2, and 5.93 kg for T3.

Table 2: Effect of feeding on dry matter intake (DMI) and DMI/100 Kg of body weight of crossbred calves

Treatments	Average body weight (kg)	Total DM intake (kg)	DM Intake/100 kg BW
T1	63.718	1.65	2.58
T2	66.050	1.80	2.72
T3	68.388	1.90	2.77
T4	68.698	2.23	3.14
T5	71.234	2.27	3.21
'F' Test	Sig.	Sig.	Sig.
S.E(M) +	0.54	0.08	0.09
CD at 5%	1.65	0.26	0.28

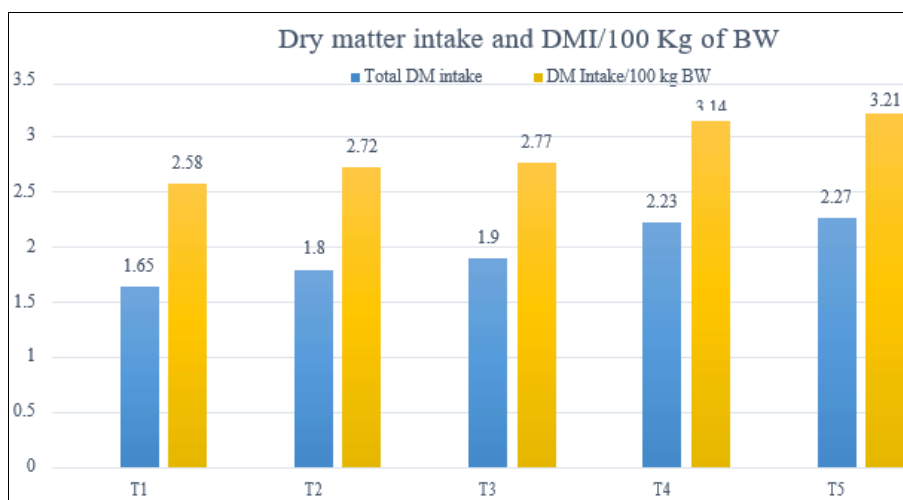


Fig 2: Effect of feeding on dry matter intake and DMI/100 kg BW under different treatments (kg)

3.2 Body weight gain

The data from Table 1. and from figure 1. revealed that the daily body weight gain kg/day/calf under the treatment T1, T2, T3, T4 and T5 were 0.192, 0.205, 0.210 and 0.246 kg, respectively. The highest body weight gain per calf was observed in T5 (32.53 kg) followed by T4 (29.56 kg), T3 (25.26 kg), T2 (24.66 kg) and T1 (23.04 kg). calves. The highest (0.271 kg/day) daily weight gain was recorded in T3 while lowest (0.192 kg/day) in T1 and highest total body weight gain (32.53 kg) was also observed under treatment T5.

This increase in body weight reflects the effect of maize silage and berseem feeding to the experimental crossbred growing calves. The final body weight of calves was observed as 75.23, 78.42, 81.02, 83.47 and 88.49 kg in treatment T1, T2, T3 and T4, respectively. Final body weight of calves was found significantly more in treatment T5 (88.49 kg) over T1, T2, T3 and T4 treatments. The results of body weight gain in present investigation are in aligned with the finding of Sonone (2016) [8], he observed that the daily weight gain highest in T2 (0.243 Kg), followed by T1(0.203 Kg), T3(0.160 Kg) and

T4(0.110 Kg). The values currently observed in the data are similar to those reported by Adangale (2009) [2], who found that calves in treatments T1, T2, and T3 had average daily

weight gains of 0.201, 0.210, and 0.204 kg, respectively, when fed jowar straw combined with soybean straw.

Table 2: Effect of feeding on average body weight gain of crossbred growing calves under different treatments (kg)

Treatments	Initial body wt. (kg)	Final body wt. (kg)	Total Body wt. gain (kg)	Weight gain/day/calf (kg)
T1	52.198	75.239	23.041	0.192
T2	53.760	78.424	24.664	0.205
T3	55.753	81.022	25.269	0.210
T4	53.916	83.477	29.561	0.246
T5	55.953	88.491	32.538	0.271
'F' Test	NS	Sig.	Sig.	sig
SE(M) ±	0.95	0.44	0.45	0.01
CD at 5%	2.91	1.36	1.38	0.02

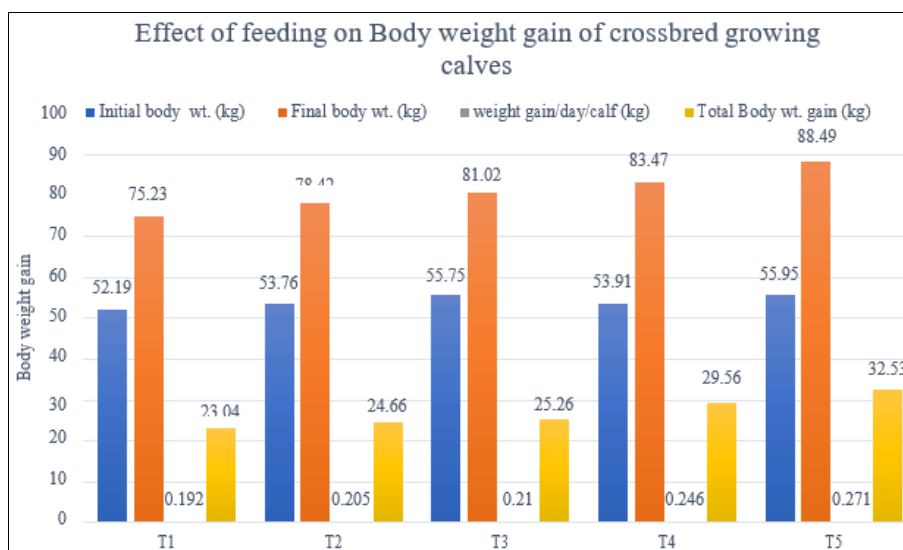


Fig 2: Effect of feeding on body weight gain under different treatment (kg)

3.3 Body measurements

3.3.1 Chest girth

It is revealed from, Table no.3 and fig 3, that the differences exhibited significant in chest girth among the treatment, while gain in chest girth was highest in T5 (12.053 cm) treatment and treatment T4 (11.07 cm), T3 (10.26 cm) T2 (9.22 cm), and T1 (8.05 cm). It is evident from table that calves from T5 group showed more chest girth as compared to other treatments.

3.3.2 Body height

It was observed from table no.3 and fig.3, that the total gain in body height over an experimental period was significantly

highest in treatment T5 (14.49 cm) followed by treatment T4 (13.67 cm), T3 (12.63 cm), T2 (10.67 cm) and T1 (10.40 cm).

3.3.3. Body length

It was observed from the Table 3 and fig 3, that the total body length gain over experimental period was 7.18, 8.84, 10.11, 11.16, and 12.058 cm in T1, T2, T3, T4 and T5, respectively. It is evident from table that calves from T5 group showed more body length as compared to other treatments. All the results of body measurements are nearer to the values reported by Kahate P. A. *et al.* (2017) [5].

Table 3: Effect of feeding on chest girth (cm), body height (cm), and body length (cm) under different treatment

Treatments	Average body weight (kg)	Total gain in chest girth (cm)	Total gain in height (cm)	Total gain in body length (cm)
T1	63.718	8.059	10.401	7.185
T2	66.050	9.224	10.675	8.845
T3	68.388	10.267	12.636	10.116
T4	68.698	11.070	13.677	11.168
T5	71.234	12.053	14.490	12.058
'F' Test	Sig.	Sig.	Sig.	Sig.
S.E(M) ±	0.54	0.11	0.46	0.08
CD at 5%	1.65	0.35	1.43	0.24

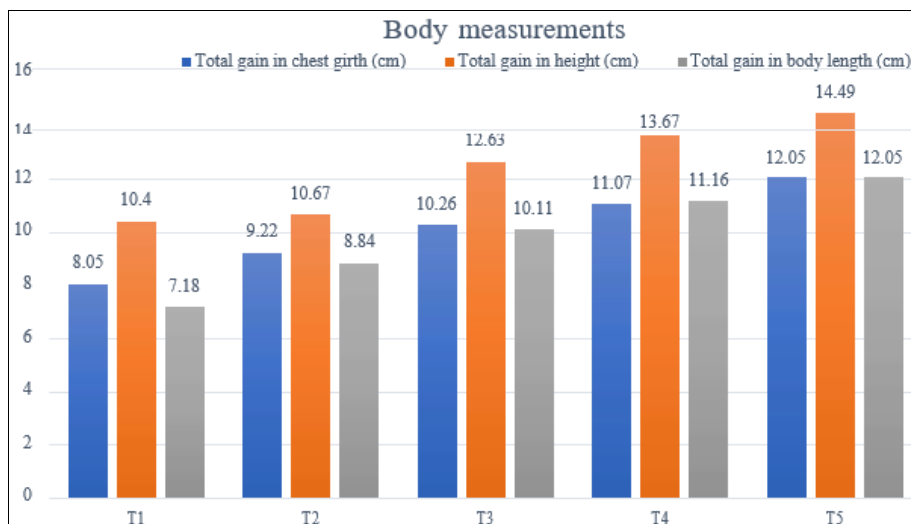


Fig 3: Effect of feeding on chest girth (cm), body height (cm), and body length (cm) under different treatments

4. Conclusion

It is proved from the results of the present study, that the treatment T5 - 60% Maize silage + 40% Berseem feeding shows statistically significant results in performance of crossbred calves. There was increase in DMI, and DMI/100 kg body weight of crossbred calves. Body measurements (Body length, Body Height, and Chand body weight shown improvement due to feeding of 60% Maize silage + 40% Berseem.

5. Acknowledgement

I am thankful to my Research Guide and Chairman, Advisory Committee, Dr. S. D. Chavan, Professor and Head of the Animal husbandry and Dairy Science Department, Post Graduate Institute, Dr. PDKV Akola for the valuable guidance and also for providing all the necessary facilities to conduct the research work.

Conflict of Interest

Not available

Financial Support

Not available

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How to Cite This Article

Deshmukh RS, Chavan SD, Shegokar SR, Kahate PA, Deshmukh JP. Study on feeding combination of maize silage (*Zea mays* L.) and berseem (*Trifolium alexandrinum*) on growth performance of crossbred growing calves. *International Journal of Veterinary Sciences and Animal Husbandry.* 2024;9(5):804-807.

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