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Growth pattern and economics of feeding liver tonic in crossbred calves

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Abstract

Twelve healthy Jersey crossbred calves of average 5 months age were allocated to two experimental groups, control (T₀) and treatment (T₁) with six animals in each group. Calves of both groups were fed with a standard basal diet consisted of concentrate, green fodder and paddy straw along with feeding of a herbal liver tonic *Rivliv** was fed orally @ 15 ml daily in the treatment group. The average initial and final body weight at 6th fortnight of the calves were 88.86±3.15 and 88.86±2.91 kg and 106.67±3.40 and 109.98±3.24 kg respectively in T₀ and T₁ groups. Analysis of variance of the data did not reveal any significant difference ($p>0.05$) of average body weight between the groups. The mean daily body weight gain in T₁ (0.25±0.01 kg) was significantly ($p<0.01$) higher than T₀ (0.19±0.00 kg). In respect of different fortnights, ADG was significantly ($p<0.01$) higher from 2nd to 6th fortnight. Similarly, the average of body weight gain in fortnights (14 days) was significantly higher ($p<0.01$) in T₁ (3.55±0.09 kg) than the T₀ (2.64±0.05 kg) group of calves. The mean body weight gain in a fortnight was higher ($p<0.01$) in T₁ group than the T₀ group from 2nd to 6th fortnight. The overall mean values of the conformation traits (cm) in T₀ and T₁ groups respectively were: 93.62±0.56 and 94.22±0.56 cm for body length; 104.12±0.65 and 104.52±0.51cm for chest girth as well as 90.08±0.77 and 90.70±0.72 cm for height at wither. All the conformation traits revealed a highly significant positive correlation ($p<0.01$) with body weight. There was non-significant ($p>0.05$) difference in all the 3 traits between the groups. The average daily cost of feed consumption (on DM basis) per calf were Rs. 37.02 and Rs. 41.11 and cost of feeding per kg body weight gain was Rs. 196.54 and Rs. 162.20 in T₀ and T₁ groups, respectively. Though, total cost of feeding was little higher in T₁ than the T₀ group, but lower cost of feeding per kg weight gain was found in T₁ than T₀.

Keywords: Crossbred calves, growth, cost, feeding, liver tonic

1. Introduction

In recent years, dairy farming in India has grown by leaps and bounds and milk production is increasing over the years with a latest record of 221.06 million tones in the year 2022 (Anonymous, 2022) [3]. The share of cow milk in India is now 51% and has surpassed the buffalo milk. The cross bred cows are becoming more popular among the Indian dairy farmers due to their high milk ability and well adaptability to local agro climatic conditions. These crossbred cows yield about 28% of the total cow milk. Calves are the future replacement stocks for cows and bulls. As such, calves are an integral and important component for the dairy farmers to continue their farming occupation to produce milk and contribute to national economy. Of the 50.42 million total crossbred cattle, number of female calf under 1 year and younger male aged up to 1.5 years are 11294801 and 2112814 respectively (Anonymous, 2019) [2]. Serious and scientific rearing is so important because optimum growth and physical development of calves in their early life possess immense bearing on their early maturity and life time production. Optimum growth and increase in body weight are essential parameters in young calves are related to their early maturity and any stage of development and also be taken as an aid to selection. Further, the sexual maturity reducing the age at first calving, number of lactations and maximum life time economic returns from their production. Initial body weight has been found to be correlated with later body weight and the growth rate at of dairy calves depends mainly on bodyweight rather than age (Ghose *et al.*, 1977) [6]. Feeding of herbal liver tonic products improves liver functions to increase appetite, feed consumption, digestion, absorption and nutrient metabolism in the body, ultimately leading to higher growth rate and body weight gain (Hadiya *et al.*, 2010) [9]. Liver tonics act as a hepato-protective, hepatic stimulant to regenerate damaged liver cells, helps to eliminate toxins and restores liver

functions to optimise secretion of bile and certain digestive enzymes for increasing appetite, efficient digestion of feed nutrients and potentiate feed assimilation and utilisation in the body leading to healthy growth and weight gain. Liver tonic containing anabolic agents helps in treating anorexia and act as a restorative in convalescence and debility. With this idea in mind, this research work was conducted to study the effect of feeding a poly herbal liver tonic, *Rivliv* on growth performances and economics there on in crossbred dairy calves.

2. Materials and Methods

The experiment was conducted on crossbred calves in the Instructional Cattle Farm under an approved animal experimental protocol from the Institutional Animal Ethics Committee (IAEC) vide order No. 770/GO/Re/S/03/CPCSEA/FVSc/AAU/IAEC/20-21/1824, dtd. 31.07.2021 and was carried out as per the guidelines of the Committee for the Purpose of Control and Supervision of Experiments in Animals (CPCSEA), Ministry of Environment, Forest and Climate Change, Government of India.

Twelve Jersey crossbred calves of similar age (5 months) and body weight were selected and randomly divided into two equal groups, viz., Control (T₀) and Treatment (T₁). The calves of both the groups were adapted for 15 days prior to experiment. During experiment, all the calves were fed a basal diet constituted of concentrate mixture and roughage. The concentrate ration (Table 1) included maize (37%), wheat bran (5%), rice polish (15%), ground nut cake (30%), mustard oil cake (10%), mineral mixture (2%) and salt (1%). Para grass (*Brachiaria mutica*) and paddy straw were given as roughage. The calves of the treatment group (T₁) was fed herbal liver tonic "*Rivliv*" individually in the morning @15ml daily, marketed by Refit Animal Care and contained herbal extracts of Sarphuntra, and Bhumiarnika and other herbs like Aruna, Yavalika and Nimfa together with vitamin B complexes (B1, B2, B3 & Biotin) and Sylimarin. The experiment was conducted for a period of six fortnights between January and April, 2021 to record data on parameters like body weight, gain in body weight, conformation traits and economics. Necessary statistical analysis was done as per methods of Snedecor and Cochran (1994)^[19].

3. Results and Discussion

3.1 Body weight

The average body weights of the calves in T₀ and T₁ groups (Table-1) were 88.86±3.15 and 88.86±2.91 kg at initial, 91.34±3.09 kg and 91.62±2.94 at 1st, 93.87±3.15 kg and 94.81±2.99 at 2nd, 96.99±3.27 and 98.11±3.05 kg at 3rd, 100.01±3.32 and 101.82±3.11 kg at 4th, 103.22±3.37 and 105.82±3.19 kg at 5th and 106.67±3.40 and 109.98±3.24 kg at 6th fortnight. The body weight of both the groups increased linearly from 1st to 6th fortnight and body weight changes were higher in all fortnights in treatment (T₁) group than the control (T₀) group. However, ANOVA test of the data did not reveal any significant difference ($p>0.05$) in the body weights of the calves in control (T₀) and treatment (T₁) groups. Findings of different workers support the present result. Rani *et al.* (2006)^[15] and Rawat *et al.* (2016)^[16] while feeding liver tonic and such herbal extracts did not found significant increase in body weight in buffalo calves and poultry respectively. However, workers like Rajkhowa *et al.* (2005)

^[14] and Hadiya *et al.* (2009)^[18] observed significant increase in bodyweight of Mithun and Buffalo calves respectively.

Table 1: Average (Mean ± SE) body weight (kg) of calves

Fortnight	Control (T ₀)	Treatment (T ₁)
Initial	88.86±3.15	88.86±2.91
1 st	91.34±3.09	91.62±2.94
2 nd	93.87±3.15	94.81±2.99
3 rd	96.99±3.27	98.11±3.05
4 th	100.01±3.32	101.82±3.11
5 th	103.22±3.37	105.82±3.19
6 th	106.67±3.40	109.98±3.24

3.2 Daily and fortnightly body weight gain

The mean daily body weight gains in T₀ and T₁ groups were 0.18±0.01 and 0.20±0.00 kg at 1st, 0.18±0.01 and 0.23±0.01 kg at 2nd, 0.19±0.01 and 0.24±0.00 kg at 3rd, 0.19±0.01 and 0.27±0.01 kg at 4th, 0.20±0.01 and 0.29±0.01 kg at 5th and 0.20±0.01 & 0.30±0.01 kg at 6th fortnight with an overall values of daily gain of 0.19±0.00 and 0.25±0.01 kg respectively. Similarly, the overall mean values of body weight gain were in T₀ and T₁ groups respectively. The mean body weight gains at different fortnights in T₀ and T₁ groups were 2.45±0.10 and 2.76±0.05 kg at 1st, 2.52±0.10 and 3.20±0.05 kg at 2nd, 2.59±0.11 and 3.33±0.06 kg at 3rd, 2.70±0.14 and 3.74±0.07 kg at 4th, 2.75±0.16 and 4.03±0.08 kg at 5th and 2.81±0.15 and 4.23±0.07 kg at 6th fortnight with averages of 2.64±0.05 and 3.55±0.09 kg respectively. Analysis of variance results revealed significant ($p<0.01$) effect of treatment of liver tonic feeding on both daily and fortnightly body weight gain of the calves. The significantly ($p<0.01$) higher body weight gain in the treatment group was due to supplementation of the herbal liver tonic *Rivliv* that improved liver functions leading to improved digestibility and assimilation of feed nutrients and ultimately resulted in higher gain in body weight. The present findings are in agreement with findings of Akbar *et al.* (1999) and Kumar *et al.* (2016)^[11] who found significant increase of body weight gain in buffalo and Holstein Friesian calves by supplementing liver tonic in their diets.

Table 2: Average (Mean ± SE) values (kg) daily and fortnightly body weight gain of calves

Fortnight	Daily gain		Fortnightly gain	
	Control (T ₀)	Treatment (T ₁)	Control (T ₀)	Treatment (T ₁)
1 st	0.18±0.01	0.20±0.00	2.45±0.10	2.76±0.05
2 nd	0.18±0.01 ^a	0.23±0.01 ^b	2.52±0.10 ^a	3.20±0.05 ^b
3 rd	0.19±0.01 ^a	0.24±0.00 ^b	2.59±0.11 ^a	3.33±0.06 ^b
4 th	0.19±0.01 ^a	0.27±0.01 ^b	2.70±0.14 ^a	3.74±0.07 ^b
5 th	0.20±0.01 ^a	0.29±0.01 ^b	2.75±0.16 ^a	4.03±0.08 ^b
6 th	0.20±0.01 ^a	0.30±0.01 ^b	2.81±0.15 ^a	4.23±0.07 ^b
Average	0.19±0.01 ^a	0.26±0.01 ^b	2.64±0.13 ^a	3.55±0.06 ^b
Total	1.14±0.01 ^a	1.53±0.01 ^b	15.82±0.15 ^a	21.29±0.08 ^b

NB: Means with different superscripts differ significantly ($p<0.05$).

3.3 Conformation traits

The average values of the different conformation traits were presented in the table-3. The average values of initial body length (cm) of the experimental calves were 90.19±1.36 and 90.27±1.11 cm and the final body length at 6th fortnight were 96.85±1.10 and 98.05±1.05 cm in control (T₀) and treatment (T₁) groups. The average initial chest girth were 101.15±1.39 cm and 100.85±0.85 cm and final chest girth at

6th fortnight of experiment of experimental calves were 107.70±1.55 and 108.26±0.95 cm in control (T₀) and treatment (T₁). Similarly, the average initial height at wither were 87.20±1.78cm and 86.83±1.67 cm and final chest girth measure at ending of experiment of experimental calves were 93.63±2.03cm and 94.81±1.69 cm respectively for control (T₀) and treatment (T₁). ANOVA of the data revealed no

significant effect ($p>0.05$) of treatment. However, all the three conformation traits increased linearly with linear increase in the body weight and revealed a highly significant ($p<0.01$) correlation with body weight (Table-4). Findings of workers like Afolayan *et al.* (2006) [11] and Jaybal *et al.* (2008) [10] found similar results in sheep and goat respectively.

Table 3: Average (Mean ± SE) of body length, chest girth and height at wither of calves

Fortnight	Body length (cm)		Chest girth (cm)		Height at wither (cm)	
	Control (T ₀)	Treatment (T ₁)	Control (T ₀)	Treatment (T ₁)	Control (T ₀)	Treatment (T ₁)
Initial	90.19 ± 1.36	90.27 ± 1.11	101.15 ± 1.39	100.85 ± 0.85	87.20 ± 1.78	86.83 ± 1.67
1 st	91.25 ± 1.27	91.79 ± 1.17	101.79 ± 1.46	101.82 ± 0.89	87.75 ± 1.85	87.84 ± 1.64
2 nd	92.33 ± 1.21	92.89 ± 1.15	102.66 ± 1.62	103.16 ± 0.88	88.79 ± 1.89	89.17 ± 1.61
3 rd	93.73 ± 1.22	94.18 ± 1.17	103.82 ± 1.65	104.56 ± 0.96	89.78 ± 2.01	90.50 ± 1.62
4 th	94.97 ± 1.19	95.62 ± 1.14	105.24 ± 1.61	105.92 ± 0.97	91.19 ± 2.09	92.01 ± 1.65
5 th	96.01 ± 1.16	96.76 ± 1.03	106.48 ± 1.66	107.04 ± 1.00	92.26 ± 2.07	93.71 ± 1.65
6 th	96.85 ± 1.10	98.05 ± 1.05	107.70 ± 1.55	108.26 ± 0.95	93.63 ± 2.03	94.81 ± 1.69

Table 4: Correlation coefficient of body weight and body measurements of calves

Body measurements	Correlation coefficient with body weight	
	Control (T ₀)	Treatment (T ₁)
Body length	0.976925**	0.946827**
Chest girth	0.9817**	0.973285**
Height at wither	0.953615**	0.935312**

** = highly significant ($p<0.01$).

3.4 Economics of feeding liver tonic

Results presented in table-5 revealed that in the control(T₀) and treatment (T₁) groups respectively, total DM consumption per calf was 220.36 and 225.68kg, cost of per kg feed (DM) was Rs. 14.11 and 14.11, cost of feed per group was Rs. 3109.28 and 3184.34, total cost of *Rivliv* liver tonic Rs 0.00 and 268.80, net cost of feed per calf was Rs. 3109.28 and 3453.14, total feed cost per day Rs. 37.02 and 41.11, weight gain per calf was 15.82 and 21.29kg and finally cost of feeding per kg gain was Rs. 196.54 and 162.20. The higher weight gain and lower cost of feed per kg weight gain indicated that feeding of liver tonic was economical and beneficial for the growing calves. Workers like Ather *et al.* (1998), Singh *et al.* (2002) [18], Mahanta *et al.* (2005) [12], Neupane *et al.* (2008) [13], Sharma *et al.* (2008) [17] and Ghosh *et al.* (2010) [7] also found that feed cost per kg body weight gain in herbal liver tonic supplemented groups were lower compared to control groups.

Table 5: Economic analysis of feeding liver tonic in calves

Component	T ₀	T ₁
Total DM consumption per calf (kg) in 84 days	220.36	225.68
Cost of feed (DM) per kg (Rs.)	14.11	14.11
Cost of feed consumption (Rs) per calf for 84 days	3109.28	3184.34
Cost involve in for feeding <i>rivliv</i> tonic (Rs) per calf	0.00	268.80
Total cost of feeding per calf in 84 days	3109.28	3453.14
Net cost of feeding/calf/day (Rs.)	37.02	41.11
Total body weight gain/calf (kg)	15.82	21.29
Cost of feeding/kg gain	196.54	162.20

4. Conclusion

The calves receiving liver tonic supplement grew faster and gained significantly higher ($p<0.01$) body weight during 5-8 months of age. Economic analysis revealed that cost of feeding per kg body weight gain was lower in calves provide liver tonic. This witnessed feeding liver tonic to the calves

was beneficial and profitable. Therefore, growing dairy calves may be supplemented with liver tonic for faster growth and profitability.

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