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Effect of feeding *Tinospora cordifolia* and *Mentha arvensis* on growth performance in crossbred calves

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Abstract

This research was conducted to study effect of feeding giloy (*Tinospora cordifolia*) and mint (*Mentha arvensis*) on growth parameter in crossbred calves. Group I was taken as control while Group II was supplemented with *Tinospora cordifolia* @ 4% of concentrate; group III with *Mentha arvensis* @ 4% of concentrate and group IV with both *Tinospora cordifolia* and *Mentha arvensis* @ 2% of concentrate each. The dry matter intake(Kg) and dry matter intake(g)/W^{0.75}Kg in group III was significantly ($P<0.05$) higher than group I but no significant difference was found between group II and IV. Body weight gain was significantly higher in group IV than group I and III. Giloy and/or mint can be fed to crossbred calves to improve growth in crossbred calves.

Keywords: Crossbred calves, feed intake, giloy, growth, mint

1. Introduction

Giloy (*Tinospora cordifolia*) is a climbing shrub .It's stems are succulent with long filiform fleshy aerial roots. It is widely used as medicine for its general antiulcer, antidiabetic, anticancer, anti-inflammatory, anti-allergic, antioxidant, anti-infective, hepato-protective properties [1]. Significantly enhanced non-specific humoral and cell mediated immune response can also be stimulated by *Tinospora cordifolia* [2]. It is helpful in treating jaundice, digestive problems such as hyperacidity, colitis, worm infestation, loss of appetite, abdominal pain, excessive thirst, vomiting and liver disorder like hepatitis. Mint (*Mentha arvensis*) thrives in cool, moist spots in partial shade. The plant is highly effective in treating headaches, rhinitis, cough, sore throat, colic and vomiting. Medicinal uses of *Mentha arvensis* are anesthetic, anti-inflammatory [3], antiseptic, antioxidant [4] antispasmodic, antimicrobial activity [5], carminative, diaphoretic, emmenagogue, febrifuge, galactofuge, salve and stomachic. Oil is extracted from the leaves of the Field Mint or Pudina plants using the steam distillation process. This oil is used for various medicinal purposes. Lemongrass and peppermint have been used as feed additive to improve production performance of beef and dairy cattle [6]. *Mentha arvensis* is reported to improve ileal protein and amino acid digestibility thus feed efficiency in weaned piglets [7]. *Mentha arvensis* is being produced in large amount by farmers of India and after extraction of the oil it can be used as feed additive since it still contains oil. *Tinospora cordifolia* and *Mentha arvensis* are of prime importance but their use as feed additive as sole or in combination has not been studied yet in crossbred calves. This experiment was conducted with the objective to study the effect of feeding *Tinospora cordifolia* and *Mentha arvensis* on feed intake and growth performance in crossbred calves.

2. Materials and Methods

Twenty crossbred calves (6-12 months of age) were selected from the herd with an average body weight of 70.5 kg from Instructional Dairy Farm, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar. After an adaption period of 10 days the calves were weighed and divided into four groups i.e., group I, group II, group III and group IV of five each in such a way that the average body weight in all the groups remained uniform. The crossbred calves of group I were provided concentrate mixture [8], group II calves with concentrate mixture with *Tinospora cordifolia* @ 4% of concentrate mixture, group III calves with concentrate mixture with *Mentha arvensis* @ 4% of concentrate mixture and group IV with concentrate mixture with *Tinospora cordifolia* @ 2% of concentrate plus *Mentha arvensis* @ 2% of concentrate along with mixed green fodder (containing green oats, green berseem and green mustard approximately in 1:1:1 ratio) and wheat straw as roughages. Green fodder and wheat straw were mixed in 10:1 ratio on fresh basis. The experimental feeding period lasted for 90 days. Fortnightly body weight and daily feed intake was recorded. Daily weight gain was calculated. Proximate analysis of feed was done as per procedure of [9] and

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statistical analysis in accordance with [10] using SPSS16.0 version software. This experiment was approved by Animal Ethic committee before starting.

3. Results and Discussion

Giloy (*Tinospora cordifolia*) contained dry matter 66.4% (92.15% organic matter, 7.5% crude protein, 6.89% ether extract, 57.1% crude fibre, 20.66% nitrogen free extract, 7.85% ash, 77.76% total carbohydrates, 59% neutral detergent fibre and 55% acid detergent fibre on dry matter basis) while mint (*Mentha arvensis*) contained dry matter 86.7% (89.7% organic matter, 18.56% crude protein, 3.4% ether extract, 10.5% crude fibre, 57.24% nitrogen free extract, 10.3% total ash, 67.74% total carbohydrates, 40.6% neutral detergent fibre and 22.6% acid detergent fibre on dry matter basis). The mixed green fodder contained 25.018% dry matter (organic matter 92.4%, crude protein 13.51%, ether extract 2.61%, crude fibre 25.5%, nitrogen-free extract 50.78%, ash 7.6%, neutral detergent fibre 44.2%, acid detergent fibre 30.75% and total carbohydrates 76.28% on dry matter basis). The wheat straw fed to calves had dry matter 90.48% (crude protein 2.7%, ether extract 1.2%, crude fibre 41.6%, nitrogen-free extract 47.8%, ash 6.7%, organic matter 93.3%, total carbohydrates 89.4%, neutral detergent fibre 78.5%, and acid detergent fibre 50.2% respectively, on dry matter basis).

During experimental feeding period, the overall daily dry matter intake, dry matter intake per 100 kg body weight was not significantly different between all the groups whereas there was significant difference in overall mean value of daily dry matter intake/ kg $W^{0.75}$ between crossbred calves of group III (121.44 ± 7.58) from group I (115.68 ± 7.84 g) and no significant difference from group II (117.75 ± 6.23 g) and group IV (116.55 ± 6.68 g). Overall dry matter Intake/100Kg body weight (kg) in crossbred calves of groups I was 3.79 ± 0.33 , group II 3.83 ± 0.28 , group III 3.97 ± 0.34 and group IV 3.78 ± 0.28 . The overall mean of average daily dry matter intake per 100 kg body weight in crossbred calves of all the groups did not differ significantly from each other. The average daily dry matter intake/ kg $W^{0.75}$ (g) in calves of group I, group II, group III and group IV during Ist fortnight was 123 ± 9.13 , 124.29 ± 8.65 , 127.85 ± 10.84 and 126.98 ± 7.59 , IInd fortnight 120.18 ± 8.76 , 121.95 ± 7.27 , 126.55 ± 9.44 and 125.89 ± 7.98 , IIIrd fortnight 116.83 ± 7.53 , 118.16 ± 5.69 , 122.61 ± 5.85 and 115.7 ± 6.23 , IVth fortnight 113.85 ± 7.55 , 115.51 ± 7.18 , 120.68 ± 6.33 and 112.66 ± 6.47 , Vth fortnight 112.29 ± 7.20 , 115.72 ± 4.79 , 117.76 ± 7.34 and 113.75 ± 6.7 and VIth fortnight 107.76 ± 6.85 , 110.88 ± 3.82 , 113.11 ± 5.69 , 111.75 ± 5.04 , respectively. There was significant difference in dry matter intake/ kg $W^{0.75}$ between the groups of crossbred calves during IIIrd fortnight in which the IIIrd group was significantly ($P < 0.05$) different than IVth group but did not differ significantly from group I and II. No significant difference was found between group I and II. During IVth fortnight IIIrd group was significantly ($P < 0.05$) higher than Ist and IVth group and did not differ significantly from group II. But there was no significant difference in dry matter intake/ kg $W^{0.75}$ between the groups of crossbred calves during Ist, IInd, Vth and VIth fortnight of experimental feeding period. Hosoda K et al. (2006) [11] reported that the dry matter intake of the diet by steers were similar among treatments, whereas the dry matter intake was significantly ($p < 0.05$) higher in the steers receiving the herbal treatment (peppermint, clove, and lemongrass) than control which was fed with total diet only. [12] has also reported significant increase in dry matter intake on supplementation of *Tinospora*

cordifolia in the murrah buffaloes. As a result herbal supplemented group shows higher dry matter intake with respect to control. Our results corroborate with the findings of [13] who reported significantly higher dry matter intake per kg metabolic body size in goats supplemented with *Mentha arvensis* compared to control group [14] also reported a tendency of higher intake of concentrates containing herbs as well as forages in calves. Menthol in the leaves of mint is appetite and digestion stimulant [15]. The possible reason for higher dry matter intake in herb supplemented feed may be due to the impact of feed supplement in physiological activity i.e. increased appetite, enzyme secretion etc. As a result digestion is accelerated and there is shortening of time of feed passage through the digestive tract further stimulating the intake [16].

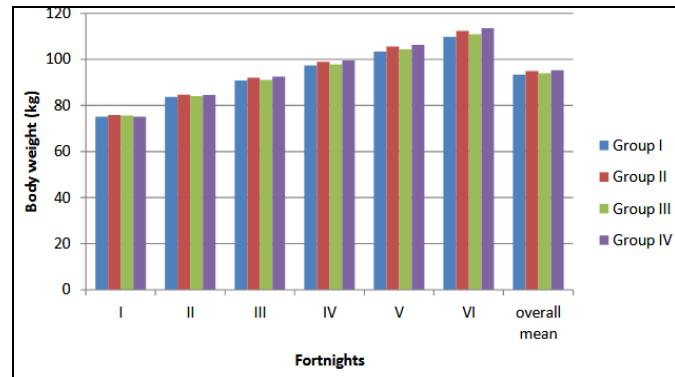


Fig 1: Average fortnightly body weight (kg) of crossbred calves during experimental feeding period of 90 days

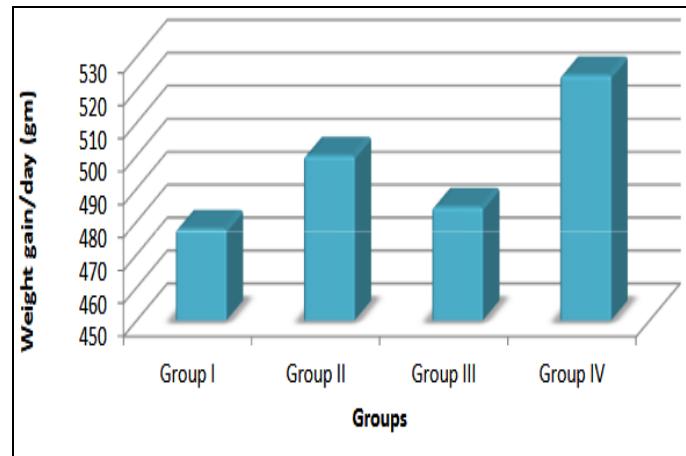


Fig 2: Average body weight gain per day (gm) of crossbred calves during experimental feeding period of 90 days.

The average initial body weight of calves of group I, II, III and IV was 70.2 ± 9.78 , 71 ± 8.30 , 70.8 ± 8.69 and 70 ± 7.27 kg, respectively. The average body weight of crossbred calves during Ist fortnight was 75.1 ± 10.42 in group I, 75.8 ± 8.72 in group II, 75.5 ± 8.88 in group III, 75.1 ± 7.67 kg in group IV. The average body weight of crossbred calves during IInd fortnight in group I was 83.7 ± 11.47 , group II 84.6 ± 9.25 , group III 84.1 ± 9.46 and group IV 84.5 ± 8.28 kg. The average body weight of crossbred calves during IIIrd fortnight for group I was 90.8 ± 12.23 , group II 92.1 ± 9.38 , group III 91.2 ± 10.07 and group IV 92.5 ± 8.66 kg. During IVth fortnight the average body weight of calves in group I was 97.3 ± 12.70 , group II 99 ± 9.53 , group III 97.8 ± 10.52 and group IV 99.5 ± 9.11 kg. During Vth fortnight the average body weight of calves in group I was 103.4 ± 13.24 , group II 105.5 ± 10.15 ,

group III 104.3 ± 11 and group IV 106.3 ± 9.58 kg while during VIth fortnight the average body weight of calves in group I 109.8 ± 13.89 , group II 112.3 ± 10.80 , group III 110.9 ± 11.47 and group IV 113.5 ± 10.03 kg. The average body weight of crossbred calves increased significantly from Ist to VIth fortnight. There was significant ($P < 0.05$) difference in average body weight during VIth fortnight in group IV(113.5Kg) from group I(109.8Kg) and no significant difference was found between group II(112.3Kg) and group III(110.9Kg). The average initial body weight of calves of group I (70.2), II(71), III(70.8) and IV(70) was almost similar but average final body weight of calves of group IV(117.2Kg) was significantly different from I (113.2Kg)and III(114.4Kg) while not significantly different from II(116Kg). There was a significant ($P < 0.05$) difference in average body weight during VIth fortnight in group IV from group I while no significant difference was found between group II and III which corroborated with the findings of [13, 17-19] who stated that supplementation of herbal feed additives results in increase in body weight. In group I there was a significant ($P < 0.05$) difference in body weight in VI fortnight from initial and I fortnight body weight while in group II there was a significant ($P < 0.05$) difference in V and VI fortnight body weight from initial and I fortnight body weight. In group III there was a significant ($P < 0.05$) difference in VI fortnight body weight from initial and I fortnight body weight. In group IV there was a significant ($P < 0.05$) difference in V and VI fortnight from initial and I fortnight body weight. The average final body weight on completion of growth trial in group I, II, III and IV was 113.2, 116, 114.4 and 117.2 kg, respectively. The average body weight gain in crossbred calves of group I was 43 ± 4.40 , group II 45 ± 4.46 , group III 43.6 ± 3.32 and of group IV 47.2 ± 3.21 kg. There was a significant difference in body weight gain in group IV from group I of crossbred calves, but no significant difference was noted among group II and III. The average daily body weight gain in crossbred calves of group I was 477.7 ± 4.89 , group II 500 ± 4.95 , group III 484.4 ± 3.69 and group IV 524.4 ± 3.57 g. There was a significant difference in average daily body weight gain in the crossbred calves of group IV and I, but no significant difference was observed between group II and III. There was no significant difference between groups I, II, III and IV in initial body weight but final body weight of group IV was significantly higher compared to group I and group III but was not significantly different from group II. Similarly average total body weight gain and average body weight gain per day in group IV was significantly higher than group I and III but not significantly different from group II. Highest body weight gain (g/day) was observed in group IV (524.4) followed by group II (500), III (484.4) and at last group I (477.7).

Patel P. et al, 2017 [20] reported similar findings in murrah buffalo calves which were supplemented with combination of Emblica officinalis and *Tinospora cordifolia*; there was a significant difference in the overall body weight gain of treatment group over control group [21] also reported that the herbs used in the self-made rumenotonic drugs (*Tinospora cordifolia* is one of the constituent) not only improve the appetite and digestion process but also stimulate growth parameters [13] reported significantly higher weight gain as well as weight gain per day in *Mentha arvensis* supplemented group of goats in comparison to the control group. This indicated positive effect of the *Mentha arvensis* as feed additive on body weight. Increase in body weight in *Tinospora cordifolia* supplemented group may be due to its

ability to reduce the loss of lipids secondary to its hypoglycemic effect [19].

4. Conclusion

Giloy or/and mint can be fed to crossbred calves to improve growth performance.

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