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Effect of anti- nutritional factors containing feed additives on growth performance in growing calves

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Abstract
The objective of this study was to evaluate the effects that different levels of Neem (*Azadirachta indica*) leaves powder (NLP), *Moringa oleifera* powder (MOP) and coconut oil (CO) have on growth performance of growing calves. Twenty growing crossbred calves (6-12 months old) were divided into four equal groups, five animals in each group. The animals were randomly assigned one of the following four treatments: group T0 was control (without feed additives), T1: fed NLP@ 2% of dry matter basis (DMB), T2 fed MOP@ 2% of DMB and T3 fed CO@ 2% of DMB. Body weight of experimental animals was recorded every fortnightly by using electronic weighing balance. The data collected through this experiment was statistically analyzed and it is observed from the present experiment, feeding of Anti- nutritional factors containing feed additives shows significant (p<0.05) effect on body weight without negatively affecting nutrient fermentation and usage.

Keywords: Growth performance, anti-nutritional factors, *Moringa oleifera*, *Azadirachta indica*, coconut oil

Introduction
Anti- nutritional factors (ANF) are an exceedingly large group of compounds with small molecular weights, which are meant for protective purposes against insects, microbes, and herbivores, in addition, to adapt to adverse environmental conditions. In nature, these ANF's play important roles as antibacterials, antifungals, antivirals, herbicides, and insecticides (Miguel, 2010) [12]; among them, antibacterial activity is one of the greatest notable contributing features for animal husbandry. ANF's are usually considered as plant secondary metabolites for calves and monogastric species. Nevertheless, few investigations have revealed that some of them would beneficially affect the host metabolism and performance when used at appropriate levels.

Animal nutritionists are experimenting with new dietary interventions in order to achieve their aim. Many chemical additives and antibiotics have been tried and employed for this purpose, but today's customer expectations favor the use of "natural or organic agents" to change rumen fermentation. Anti-Nutritional Factors (ANFs) have emerged as a potential alternative feed addition in this attempt. Because ANFs are antimicrobial, their involvement in modifying the rumen microbial pattern to inhibit methanogenesis has been proposed (Patra *et al.* 2010) [14]. ANFs are naturally occurring substances that are both safe for animals and socially acceptable due to their frequent usage in kitchens. Anti-nutritional agents such tannins, saponins, essential oils (EOs), and flavonoids have been shown to lower methane emissions and enhance feed utilization efficiency by altering the rumen microbial fermentation system (Rira *et al.* 2015; Inamdar *et al.* 2015) [17, 10]. At larger dosages, ANFs are extremely successful in methane reduction measures, increasing growth rate, although fiber digestibility is significantly lowered (Pawar *et al.* 2014) [16].

In other trials, including neem leaves into ruminant meals improved plant utility and alleviated the severe feed shortfall that occurred during the lean season. (Neeti, 2017). Because of its high protein, carotenoids, numerous minerals and vitamins (such as iron and ascorbic acid), and some phytochemicals, *Moringa oleifera* has been identified as a potentially effective animal feed (kaempferitrin, isoquercitrin, rhamnetin, kaempferol and quercetin). Combining anti-methanogenic substances with complementary mechanisms of action is a viable strategy for achieving effective CH_4 reduction without affecting feed intake or rumen fermentation (Patra *et al.* 2017) [15].

Material and Methods

Location of the study

The experiment was carried out (January to April 2021) at Research Cum Development Project (RCDP), Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist – Ahmednagar, Maharashtra Province of India. The study was conducted to know the performance of crossbred calves fed on Anti – nutritional factors containing feed additives.

Selection and feeding of experimental animals

Twenty growing crossbred calves (6-12 months old) were taken from the RCDP and fed concentrate mixture and roughages (green and dry fodder) as per ICAR (2013) [9] feeding standards for 500g daily body weight gain. To take care of any nutritional deficiency chelated minerals also added in the basal diet (Bhosale *et al.*, 2021) [2]. Details of the experimental diet are presented in table 1. All the calves were randomly divided into four equal groups each consisting of five crossbred calves.

Weighing of animals and Statistical analysis

Body weight of experimental animals was recorded every fortnightly by using electronic weighing balance. The data collected through this experiment was statistically analyzed by using one way ANOVA in the SPSS computer package (SPSS version 22.0, SPSS Inc., Chicago, USA). For all statistical analyses, probability values less than 0.05 were considered as significant.

Results and Discussion

Growth Performance (kg)

Results of fortnightly body weight changes in different groups were presented in table 2; figure 1. The examination of data over 4 months of experimental feeding revealed that the dietary interventions to the animals impart significant (p<0.05) effect on the growth pattern of the growing calves. Initial body weight (kg) of calves was 70.10±2.25, 70.40±3.61, 71.00±1.23 and 70.20±2.07 kg. Final body weight (kg) 118.60±2.69, 130.00±1.18, 143.00±1.52 and 125.80±4.12 kg for different treatment groups. The average body weight (kg) was 93.52±1.91, 100.33±2.95, 105.96±1.62 and 97.14±2.61 kg for T0, T1, T2 and T3 respectively. Treatment T2 showed significantly higher (p<0.05) BW over T0 & T3 while it was at par with T1.

The moringa leaves, fresh pods, seeds, and roots are being widely and increasingly used by humans and animals because of their higher contents of essential nutrients (CSIR 1962; Hartwell 1971) [4]. Ahmad *et al.* (2017) [1] also suggested that feeding suckling buffalo calves plus dry *Moringa oleifera* leaves (DMOL), at the levels of 5, 10 and 15% could play as natural growth promoter as mentioned by Bose (1980) [3] and El-Badawi *et al.* (2014) [5]. The improvement in body weight gain may be attributed to the rich content of nutrients in DMOL (Sarwatt, 2004; Kakengi 2005) [18, 11] and antimicrobial properties of Moringa (Fahey, 2005) [6].

Average Daily Gain (ADG, gm)

The average daily gain (ADG, gm) of the control and treatment groups were statistically (p<0.05) significant. It is presented in table 3 also depicted in figure 2. The overall mean of average daily gain (ADG, gm) was 419±28, 557±23, 620±33 and 492±48 gm for T0, T1, T2 and T3 respectively and it was statistically significant (p<0.05). The highest average daily gain (gm) was observed in T2 followed by T1, T3 and T0. ADG was found highest in treatment T2 and non-significant (p>0.05) with treatment T1 and statistically superior (p<0.05) over T0, T3. Treatment T1 & T3 is at par with each other.

Conclusion

It can be concluded from the present research work that addition of anti- nutritional factors containing feed additives such as NLP, MOP and CO @2% of DMB could positively improve the growth performance of growing calves.

Table 1: Details of Experimental Diet

Groups	Composition
T0	Green Fodder + Dry Fodder + Concentrate Mixture. (The animals were fed concentrate mixture and Roughages as per ICAR (2013) feeding standards for 500g daily body weight gain.)
T1	T0 + Diet supplemented with phytochemicals as feed additive (Neem Leaves Powder @ 2% DMB)
T2	T0 + Diet supplemented with phytochemicals as feed additive (*Moringa oleifera* Powder @ 2% DMB)
T3	T0 + Diet supplemented with phytochemicals as feed additive (Coconut Oil @ 2% DMB)

Table 2: Effect of feeding anti- nutritional factors containing feed additives on body weight changes of growing calves (BW, kg)

Attributes	T0	T1	T2	T3	SEM	C.D.
0	70.10±2.25	70.40±3.61	71.00±1.22	70.20±2.07	2.44	NS
15	74.70±1.88	79.90±5.29	81.74±3.47	75.86±2.52	3.53	9.71
30	78.00±1.55^{b}	84.20±3.62^{ab}	88.32±1.00^{a}	81.77±2.46^{ab}	2.38	6.85
45	84.30±2.58^{b}	90.20±2.48^{ab}	96.00±1.64^{a}	87.20±2.03^{b}	2.21	6.41
60	92.80±1.93^{b}	98.30±3.68^{b}	106.60±1.21^{a}	96.39±3.00^{b}	2.63	7.76
75	100.40±2.11^{c}	108.80±2.52^{ab}	114.20±1.36^{a}	104.40±2.98^{bc}	2.32	6.89
90	107.80±1.16^{c}	116.00±2.07^{ab}	121.80±1.66^{a}	112.60±2.77^{bc}	2.00	5.54
105	115.00±1.05^{d}	125.20±2.06^{b}	131.00±1.48^{a}	120.00±1.58^{c}	1.58	4.74
120	118.60±2.69^{c}	130.00±1.18^{b}	143.00±1.52^{a}	125.80±4.12^{bc}	2.64	7.63
Overall Mean	93.52±1.91^{b}	100.33±2.95^{ab}	105.96±1.62^{a}	97.14±2.61^{b}	2.42	7.14

^{abcd} Within a column means without common superscript differs (p<0.05). CD @5%;

T0, Control; T1, NLP@ 2% of DM basis; T2, MOP@ 2% of DM basis; T3, CO@ 2% of DM basis; T, Treatment; SEM, Standard error of mean; P, Probability.

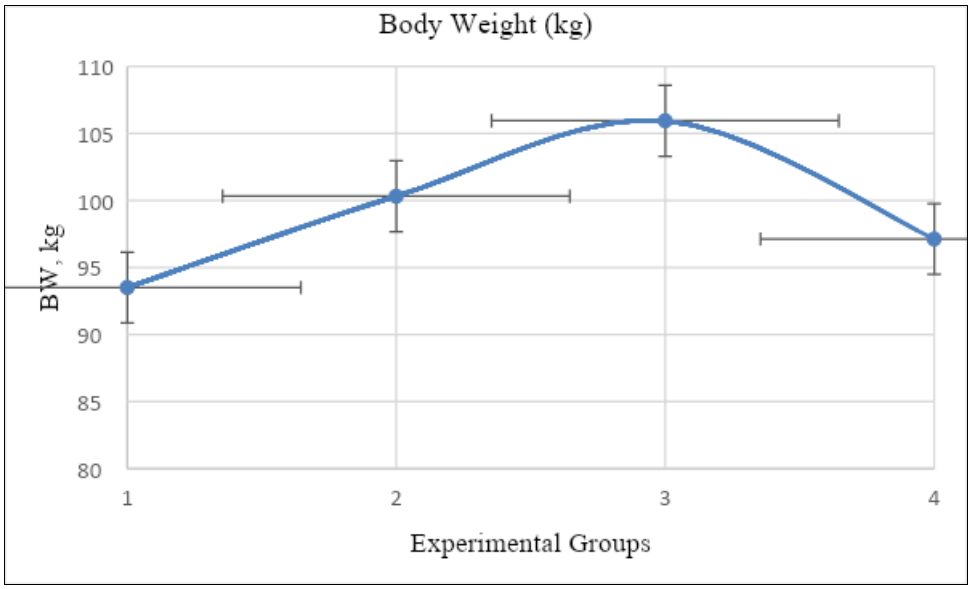

Fig 1: Effect of feeding phytochemicals containing feed additives on body weight changes of growing calves (BW, kg)

Table 3: Effect of feeding phytochemicals containing feed additives on average daily gain (ADG, gm) of growing calves

Attributes	T0	T1	T2	T3	SEM	C.D.
15	306±55^{c}	458±21^{ab}	502±31^{a}	377±41^{bc}	39.16	109.6
30	310±19^{b}	512±15^{a}	536±48^{a}	394±57^{b}	38.85	106.8
45	362±20	524±24	549±33	468±112	60.28	173.6
60	393±6^{c}	548±20^{ab}	639±30^{a}	513±62^{b}	35.97	104.3
75	434±32^{c}	569±33^{ab}	651±34^{a}	538±24^{b}	31.00	91.5
90	508±49^{c}	618±21^{ab}	660±18^{a}	517±38^{bc}	33.96	100.9
105	514±23^{c}	585±24^{b}	678±18^{a}	547±14^{bc}	20.21	56.0
120	522±16^{c}	640±28^{ab}	748±53^{a}	579±38^{bc}	36.52	109.6
Overall Mean	419±28^{c}	557±23^{ab}	620±33^{a}	492±48^{bc}	36.99	106.9

^{abc}Within a column means without common superscript differs (P<0.05). CD @5%;
T0, Control; T1, Neem Leaves Powder @ 2% of DM basis; T2, *Moringa oleifera* Powder @ 2% of DM basis; T3, Coconut oil @ 2% of DM basis; T, Treatment; SEM, Standard error of mean; P, Probability.

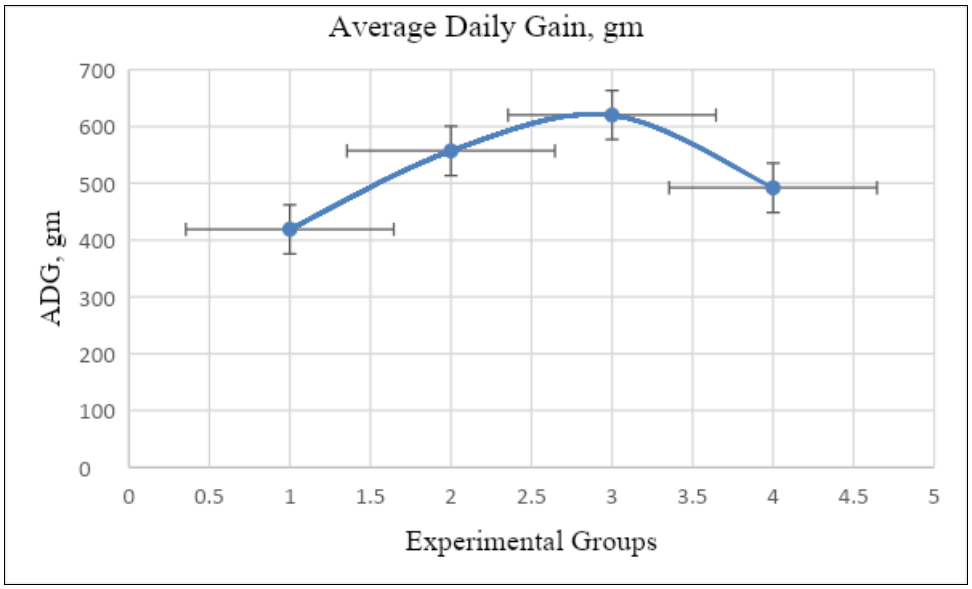

Fig 2: Effect of feeding phytochemicals containing feed additives on average daily gain (ADG, gm)

References

1. Ahmad AE, Ibrahim AAS, Ebtehag IMAE, Mohamed SA, Hassan MS. Effect of feeding dry *Moringa oleifera* leaves on the performance of suckling buffalo calves. Asian J Anim. Sci. 2017;11(1):32-39.
2. Bhosale TR, Antre GR, Kumar D, Pandey RK. Effect of chelated minerals supplement on milk yield and composition of Sahiwal and Hariana Cows. Asian Journal of Dairy and Food Research. 2021;40(2):189-192.
3. Bose B. Enhancement of nodulation of Vigna-mungo by ethanolic extract of moringa leaves: A new report. National Academy Science Letters-India. 1980;3(4):103-104.
4. CSIR. The Wealth of India. A dictionary of Indian raw

materials and industrial products. Raw material, volume 6:L-M,New Delhi, CSIR, India, 1962.
5. El-Badawi AY, Omer HAA, Abedo AA, Yacout MHM. Response of growing New Zealand white rabbits to rations supplemented with different levels of *Moringa oleifera* dry leaves. Global Veterinaria. 2014;12(4):573-582.
6. Fahey JW. *Moringa oleifera*: A review of the medical evidence for its nutritional, therapeutic, and prophylactic properties. Part 1. Trees for life Journal. 2005;1(5):1-15.
7. Hartwell JL. Plants used against cancer. A survey. Lloydia. 1971;34(1):103-160.
8. IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.
9. ICAR. Nutrients requirements of cattle and buffalo, Indian Council of Agricultural Research, New Delhi, 2013.
10. Inamdar AI, Chaudhary LC, Agarwal N, Kamra DN. Effect of *Madhuca longifolia* and *Terminalia chebula* on methane production and nutrient utilization in buffaloes. Animal Feed Science and Technology. 2015;201:38-45.
11. Kakengi AMV, Shem MN, Sarwatt SV, Fujihara T. Can *Moringa oleifera* be used as a protein supplement for ruminants?. Asian-australasian journal of animal sciences. 2005;18(1):42-47.
12. Miguel MG, Antioxidant and anti-inflammatory activities of essential oils: A short review. Molecules. 2010;15:9252-9287.
13. Neeti. Effect of feeding a rumen modifier on Methane production and performance of Buffalo calves. M.V.Sc. Thesis, Deemed University, Indian Veterinary Research Institute, Izatnagar, India, 2017.
14. Patra AK, Saxena J. A new perspective on the use of plant secondary metabolites to inhibit methanogenesis in the rumen. Phytochemistry. 2010;71:(11-12), 1198-1222.
15. Patra A, Park T, Kim M, Yu Z. Rumen methanogens and mitigation of methane emission by anti-methanogenic compounds and substances. Journal of Animal Science and Biotechnology. 2017;8(1):1-18.
16. Pawar MM, Kamra DN, Agarwal N, Chaudhary LC. Effects of essential oils on *in vitro* methanogenesis and feed fermentation with buffalo rumen liquor. Agricultural Research. 2014;3(1):67-74.
17. Rira M, Morgavi DP, Archimède H, Marie-Magdeleine C, Popova M, Bousseboua H, *et al*. Potential of tannin-rich plants for modulating ruminal microbes and ruminal fermentation in sheep. Journal of Animal Science. 2015;93(1):334-347.
18. Sarwatt SV, Milang'ha MS, Lekule FP, Madalla N. *Moringa oleifera* and cottonseed cake as supplements for smallholder dairy cows fed Napier grass. Livest. Res. Rur. Dev. 2004;16(6):12-18.