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Effect of garlic (*Allium sativum*) supplementation on the blood parameters and cost structure in buffalo calves at organized farm

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Abstract
The present investigation was carried out to study "Effect of Garlic (*Allium sativum*) Supplementation on The Blood Parameters and Cost structure in Buffalo Calves at Organized Farm". Sixteen buffalo calves of 5 to 6 months age were selected and distributed into four treatments T_0, T_1, T_2 and T_3 respectively for the experimental period of 90 days. T_0 was considered as control and T_1, T_2 and T_3 were supplemented with garlic powder at the rate of 200, 300 and 400 mg per kg body weight, respectively in concentrate mixture. The objectives of the present research were to study the effect of garlic powder supplementation on Blood Parameters and cost structure of buffalo calves. Complete randomized design (CRD) was used for the analysis of data. Results of the present investigation show there is no any adverse effect of Garlic powder supplementation on albumin, blood glucose level of experimental calves. The total protein and serum globulin of calves of treatment T_2 and T_1 show superior significant difference over control treatment T_0 and cost of feeding treatment T_2 has highest cost per kg live weight gain and T_0 (control) has low cost per kg live weight gain. It was concluded that the supplementation of garlic powder in concentrate mixture at the rate of 300 mg per kg body weight showed improved total protein, serum globulin and higher the cost of feeding over control group.

Keywords: buffalo calves, garlic powder, blood parameters, cost structure

Introduction
Livestock is an important component of agricultural sector in India. Livestock makes many-sided contributions to socioeconomic development. Its role in food and nutritional security has been well-known since times. But, in the mixed crop-livestock system its prominence goes beyond direct food production. It provides draught power and organic manure to crop sector and bones, blood, hides, skins and fiber to industries. Livestock in India is kept mostly by small landholders and the landless that form most of rural population. Thus, by being as an important source of income and employment for these house-holds livestock helps relieve poverty and smoothen income distribution and also, livestock asset can easily liquidate, and thus acts as a cushion against shocks of crop failure mainly in the less favored environments. A great promise can be seen through this livestock sector for developing farmers income.
Livestock are the backbone of rural economy in India. Buffaloes occupy a important place in the social, economic and cultural life of Indian rural communities and are useful as a triple purpose animal for milk, meat and draft power. Buffalo calves are the future replacement stock of the herd. Calves are often neglected because they required financial investment and they do not result in any immediate returns. However, serious attention should be given to calf rearing because initial growth of an animal is the most important phase of its life and induces immense bearing on the early maturity and production; initial body weight has been found to be associate with later body weight and the growth rates at any stage of development can also be taken as an aid to selection. Further, the sexual development depends mainly on body weight rather than age (Ghose *et al*. 1979). Production and reproduction status of any herd generally depends on growth and vigour of calves. Growth is a complex phenomenon and difficult to define in simple phrase. Growth is taken as increase in body weight. Overall dairy farm profit can be maximized by reducing calf fatality, better management practices and supplementation of the good nutrients and feed additives. The body weight of the calves is an essential parameter with respect to attainment of sexual maturity, age at first calving and the total number of lactations. Good supplementation of nutrients and feed additives are of paramount importance for calf growth and health. It is proven that supplementation of rumen function,

modulators, liver tonics and immunomodulators, at an early age helps in strengthening the immunity and to prohibit diseases (Prasad *et al*., 2005) [10]. Therefore, attainment of optimum body weight at an initial age is very important. Many substances have been supplemented in calf diet to get the desired result, and a new development is the use of herbs.

Garlic (*Allium Sativum*) is one of the most extensive bulb crop in India. The garlic bulb contain a dull, aromatic, and water-soluble component called allicin. Garlic contains enzymes, vitamin B, flavonoids, and various minerals. Garlic is a high quality resource of antioxidants and protein. Garlic supplementation through the feed has lots of encouraging health benefits and scientific effects, which comprise improvement of immune function, revised overseas compound detoxification, restitution of bodily potency, and fighting to diverse stresses cancer- preventive measures of garlic, garlic extracts and its mechanism have been established in the animals. Among the various supplements, aged garlic extract has been analyzed and considered widely for their exalted antioxidant substance and health-protective prospective (Mishra *et al*., 2020) [9].

Therefore, the present study entitled "Effect of Garlic (*Allium sativum*) Supplementation on The Blood Parameters and Cost Structure in Buffalo Calves at Organized Farm" was conducted at buffalo unit, Department of Animal Husbandry and Dairy Science, College of Agriculture, VNMKV, Parbhani with the fallowing objectives.

1. To study the effect of (*Allium sativum*) garlic supplementation on Blood Parameters of buffalo calves.
2. To estimate the cost structure.

Materials and Methods

Experimental site and materials

The experiment was conducted at Buffalo Unit, Department of Animal Husbandry and Dairy Science, College of agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani During the 1 march 2021 to 31 may 2021. Garlic was purchased from local mandi and then dried. After drying outer husk was separated and the bulbs were grind to powder by electric grinder.

Experimental animals and design

Total 16 Buffalo calves of same age and similar conformation were selected from the Buffalo Unit to conducted the experiment. Calves were grouped under same weight and average age in four treatments groups and four calves in each group. T_0 was considered as control and T_1, T_2 and T_3 were supplemented with garlic powder at the rate of 200, 300 and 400 mg per kg body weight, respectively in concentrate mixture. All the calves were free from diseases and physiological disorders. The experimental period was 90 days and 15 days pre-experimental period.

Parameters studied

Blood parameters of experimental buffalo calves were analyzed at the start of experiment (0 days) and at the end of experiments (90 days). Various blood parameters *viz.,* Total protein, serum albumin, serum globulin and glucose level was determined from local pathological lab as per standard methods and cost structure were recorded during the experimental period.

Statistical analysis

The data obtained was analyzed by using Complete Randomized Design (CRD). The standard errors (SE) and critical differences (CD) at 5 per cent level of significance were worked out for comparison of treatments and presented in the respective table.

Results and Discussion

Effect of Garlic (*Allium sativum*) Supplementation on the blood parameters in Buffalo Calves

Protein and serum globulin: data in table no 2 showed that total protein and serum globulin were significantly increased by the garlic powder supplementation**.** The results obtained in present study are comparable with Hassan *et al*., (2013) [8] who reported that the significant (P<0.05) increase in the serum total protein and globulin in the growing buffalo calves fed treated diet compared with those fed the control. Results are similar with Ei-Ashry *et al*., (2006) [4] who reported the effect of dietary supplemented with medicinal herb on nutrient digestibility and some blood metabolites of buffalo calves.

Table 2 showed compatibility Egunjobi & Fatoba (2017) [3] who observed that the serum globulin significantly increased with higher level of garlic powder supplementation. Similar result reported by Ahmed *et al*., (2009) [1] who observed that the adding natural juice of vegetable and fruitage to ruminant diets (B) nutrient utilization, microbial safety and immunity, effect of diets suplementated with lemon, onion and garlic juice fed to growing buffalo calves.

Results are also corroborated with Shokrollahi *et al*., (2016) [12] who investigated the Serum globulin was higher in kids given garlic extract supplementation compared to those in the control group with group T1 showing the highest levels.

Albumin and blood glucose level: Table no 2 it was observed that garlic powder supplementation group slightly decresed albumin and blood glucose level throughout whole experimental period. The result obtained in present study are concordant with Hassan *et al*., (2013) [8] who reported that the serum albumin were significantly decreased (P<0.05) in the buffalo calves fed treated diet at levels of 2 g caraway seed (CS, T1), 2 g dried garlic (DG, T2) compared with those fed the control one. The results obtained from this study corresponds with the Egunjobi & Fatoba (2017) [3] who reported the total protein (TP), glucose and albumin decreased significantly (P<0.05) with higher levels of garlic powder supplementation and El-katcha *et al*., (2016) [5] It was observed garlic extract supplementation slightly decreased blood serum albumin. Results are also corroborated with Ahmed *et al*. (2009) [1] who reported that the adding natural juice of vegetable and fruitage to ruminant diets (B) nutrient utilization, microbial safety and immunity, effect of diets suplementated with lemon, onion and garlic juice fed to growing buffalo calves.

Table 1: Effect of Garlic (*Allium sativum*) Supplementation on blood parameters of Buffalo Calves

Particulars	T0 (control)	T1	T2	T3	C.D (0.05)	S.E
Initial total protein (g/dl)	5.95	5.85	6.11	6.21	NS	0.134
Final total protein (g/dl)	6.31^{b}	6.45^{ab}	6.84^{a}	6.25^{b}	0.391	0.127
Initial albumin (g/dl)	2.41	2.37	2.30	2.24	NS	0.045
Final albumin (g/dl)	2.19	2.20	2.29	2.23	NS	0.048
Initial globulin (g/dl)	3.48	3.47	3.65	3.66	NS	0.095
Final globulin (g/dl)	4.10^{b}	4.21^{b}	4.59^{a}	4.33^{ab}	0.319	0.104
Initial blood glucose level (mg/dl)	58.95	60.97	62.73	63.32	NS	2.437
Final blood glucose level (mg/dl)	63.64	58.28	58.31	59.48	NS	4.134

Note: The means with different superscript in the same row differed significantly ($P<0.05$)

Estimate the cost structure

Table 2 showed the cost analysis of feeding different level of garlic powder, concentrate and green, dry roughages to buffalo calves. Cost of feeding of buffalo calves were lowest in control group and highest in the garlic treated group. Total cost of concentrate and roughages intake increased significantly as level of garlic powder increased. The data from the Table 2 showed similarities with Egunjobi & Fatoba (2017) [3] who observed that the cost per weight gain which was also significantly higher in supplemented group compared to control. Ghosh *et al*., (2010) [7] who investigated the supplementation of garlic powder can be effective for production cost efficiency.

Results are also corroborated with Mishra *et al*., (2020) [9] who reported the T_4 group reduced the cost of feeding was observed. The result is agreement with Rashid *et al*., (2015) [11] who observed that the cost per kg gain of Brahman crossbred growing calves, it may be concluded that the diet consisting of 55:45 C:R may be used for economic beef production.

Table 2: Cost of feeding garlic (*Allium sativum*), green roughages, dry roughages and concentrate (kg) to buffalo calves

Sr. No	Treatments	T_0		T_1		T_2		T_3	
	Particulars	Quantity (kg)	Cost (Rs)	Quantity (kg)	Cost (Rs)	Quantity (kg)	Cost (Rs)	Quantity (kg)	Cost (Rs)
1	Garlic (Rs. 70/kg)	-	-	15.65	1095.5	23.97	1677.9	31.08	2175.6
2	Concentrate (Rs. 20/kg)	248.98	4979.6	281.38	5627.6	292.18	5843.6	289.78	5195.6
3	Green roughages (Rs. 2/kg)	1012.05	2024.1	1152.4	2304.8	1217.2	2434.4	1055.25	2050.5
4	Dry roughages (Rs.3/kg)	340.65	1021.95	383.85	1151.55	416.25	1248.75	351.45	1054.35
5	Total feeding cost	-	8024.6	-	10179.45	-	11504.65	-	10475.45
6	Total live weight gain	-	44.65	-	48.55	-	50.45	-	46.00
7	Cost per kg live weight gain (Rs. /kg)	-	179.72	-	209.66	-	228.04	-	227.72

Conclusion

There is no adverse effect of garlic (*Allium sativum)* powder on serum albumin, blood glucose level of Buffalo calves. Improvement in total protein and serum globulin is identified for all treatments groups. The cost of feeding per kg live weight gain was highest in T_2 as compared to T_0, T_1, and T_3.

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