Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2020; 8(6): 473-477

Received: 02-07-2020
Accepted: 12-08-2020

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Effect of feeding different sources of digestible crude protein in buffalo calves

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Abstract
This study determined the twelve growing buffalo calves, weighed about 141 kg, was selected from Livestock Research Center of Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, for this experiment. Growing buffalo calves were placed on three dietary treatments i.e. recommended plane of nutrition, improved village practice (Leaonard C. Kearl, 1982) and grazing treatments. This experiment was conducted to study the effect of dietary treatments on DCP consumption, ME consumption, cumulative DCP consumption, cumulative ME consumption, utilization efficiency of metabolic energy and digestible crude protein. Dietary treatments were (1) recommended plane of nutrition (Leonard C. Kearl, 1982) (2) improved village practice and (3) grazing. Feed ingredients used during experimentation periods were paddy straw, wheat straw, barseem (green fodder), maize grain, mustard oil cake and urea. Mineral mixture and common salt were provided to all except animals on grazing. These animals were placed on dietary treatments, in a group of 4 for 6th fortnights. Intake of DCP 505.250 gm/day was significantly higher on improved village practice treatment during 6th fortnight due to inclusion of barseem in the diet (Table1). Cumulative DCP consumption at end of the experiment was significantly higher on improved village practice (41842.500 gm) followed by recommended plane of nutrition (27532.500 gm). DCP utilization efficiency was better on grazing treatment during 6th fortnight and it was due to restriction in the fodder available for grazing.

Keywords: Feed, digestible crude protein, buffalo calves

Introduction
The complete feed system is one of the latest developments in this context to exploit the potential of locally available animal feed resources in the best possible way. Balanced and economical feeding of livestock is extremely important for optimum productivity. To minimize feed costs and labor, and to maximize production is the need of the time and can be achieved by blending concentrate, mainly comprised locally available by-products and roughage portions of the ration to form complete feed/diet, synonymously termed as total mixed ration (TMR). Complete feed with the use of fibrous crop residue is a noble way to increase the intake and to improve feed utilization and animal production performance. The complete feed system is being increasingly appreciated as it allows expanded the use of agro-industrial byproducts, crop residues and non-conventional feeds in livestock ration for maximizing production and minimizing feeding cost by Beigh YA *et al.,* (2017) [1]. Therefore, the present study was undertaken with the following objective as to study the effect of protein supplementation on growth performance buffalo claves during different fourth night period. In the computation of cattle ration of the total requirement of DM, DCP and TDN is determined for 24 hours. The requirement of the quantity of DM depend on the body weight of the animal and also the nature of its production cattle will generally eat 2.0-2.5Kg per 100K g of live weight per day. Buffalo and crossbred animal relatively eat more dry matter consumption vary 2.5-3.0 Kg of body weight per day. naturally they requirement of organic nutrient like carbohydrate, protein and fat come from the total dry matter which is given to animal. the grazing of animal all our country is neglected as the facilities for grazing is extremely poor, while total calculating the total requirement of DCP and TDN one should consider the physiological need or Say the purpose for which the animal have to be feed (Badve, 1991) [2].

Materials and Methods

Animals: Twelve young buffalo calves aged about 14 to 24 months were selected from Livestock Research Center, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut. They were divided into three groups on the basis of their body weight, having four calves in each group. The entire animals were kept on grazing for a period of three months and then on similar diet for 2 months before the start of the experiment. The average initial body weights of three groups were 136.400, 141.075 and 147.000 kg and there was no significant difference in group body weight of calves.

Housing of the animals: The growing buffalo calves were housed in a well ventilated and protected shed. The arrangements were made to offer feed separately in the manger during the entire period of the experimentation. Feed steal guards were used to keep the animals separately and provide them sufficient space. Thick polythene sheets were used to cover the sides of the shed to protect the animals during winter.

Statistically analysis: Experimental data were analyzed in Completely Randomized Design (CRD).

Digestible Crude Protein (DCP) consumption (gm) during each fortnight. Cumulative Digestible crude protein (DCP) consumption (gm) during each fortnight. Digestible crude protein (DCP) utilization efficiency (DCP consumed (g)/ weight gain (g)) during each fortnight. Metabolic energy consumption (k cal/day) during each fortnight. Cumulative metabolic energy consumption (k cal) in each fortnight. Metabolic energy utilization efficiency (k cal consumed/ weight gain (g)) during each fortnight.

Result and Discussion

Average digestible crude protein consumption (gm/day/head).

Table 1: Digestible Crude Protein consumption (gm/day) in growing buffalo calves during different fortnights.

Treatment	1st fortnight Mean	2nd fortnight mean	3rd fortnight mean	4th fortnight mean	5th fortnight mean	6th fortnight mean
Rec	282.000±23.534 [b]	287.000±24.348[c]	303.500±22.511[b]	309.500±22.392[b]	321.500±22.247[b]	327.500±21.329[b]
IVP	419.250±14.044 [c]	455.000±25.245 [b]	463.250±24.834 [c]	460.500±20.843[c]	486.000±17.383[c]	505.250±15.478[c]
Gr	157.000±12.213 [a]	145.000±12.227[a]	135.750±16.454 [a]	181.750±17.941[a]	175.500±13.451[a]	213.500±13.555[a]
CD	56.200	69.574	69.93	66.428	58.577	55.509

Average digestible crude protein consumption in growing buffalo calves during 1st fortnight, fed on different dietary treatments

Digestible crude protein consumption during 1st fortnight were significantly different from each other (Table 1). Highest digestible crude protein consumption was (419.250 gm/day/head) on improved village practice treatment. Lowest digestible crude protein consumption was on grazing practice treatment (157.000 gm/day/head) and digestible crude protein consumption on recommended plane of nutrition was 282.000 gm/day/head.

Average digestible crude protein consumption in growing buffalo calves during 2nd fortnight, fed on different dietary treatments

Digestible crude protein consumption during 2nd fortnight were significantly different from each other treatment (Table 1). Highest digestible crude protein consumption was (455.000 gm/day/head) on improved village practice treatment. Lowest digestible crude protein consumption was on grazing treatment (145.000 gm/day/head) and digestible crude protein consumption on recommended plane of nutrition was 287.000 gm/day/head.

Average digestible crude protein consumption in growing buffalo calves during 3rd fortnight, fed on different dietary treatments

Digestible crude protein consumption on each treatment during 3rd fortnight were significantly different from each other (Table 1). Highest digestible crude protein consumption was (463.250 gm/day/head) on improved village practice treatment. Lowest digestible crude protein consumption was on grazing treatment (135.750 gm/day/head) and digestible crude protein consumption on recommended plane of nutrition was 303.500 gm/day/head.

Average digestible crude protein consumption in growing buffalo calves during 4th fortnight, fed on different dietary treatments: Digestible crude protein consumption during 4th fortnight were significantly different from each other (Table 1). Highest digestible crude protein consumption (460.500 gm/day/head) was on improved village practice treatment. Lowest digestible crude protein consumption was on grazing treatment (181.750 gm/day/head) and digestible crude protein consumption on recommended plane of nutrition was 309.500 gm/day/head.

Digestible crude protein consumption in growing buffalo calves treatments during 5th fortnight, fed on different dietary: Digestible crude protein consumption during 5th fortnight were significantly different from each other (Table 1). Highest digestible crude protein consumption was (486.000 gm/day/head) on improved village practice treatment. Lowest digestible crude protein consumption was on grazing treatment (175.500 gm/day/head) and digestible crude protein consumption on recommended plane of nutrition was 321.500 gm/day/head.

Average digestible crude protein consumption in growing buffalo calves during 6th fortnight, fed on different dietary treatments: Digestible crude protein consumption during 6th fortnight were significantly different from each other (Table 1). Highest digestible crude protein consumption was (505.250 gm/day/head) on improved village practice treatment. Lowest digestible crude protein consumption was on grazing practice treatment (213.500 gm/day/head) and digestible crude protein consumption on recommended plane of nutrition was 327.500 gm/day/head. Similar findings were also observed by Kearl, Leonard 1982 [17], Yadav, J. (1986) [19], Garcia-Bojalil, M. *et al*., (1988) [27] and Malik Raman (1998) [28].

Average cumulative digestible crude protein consumption (gm/day/head): Average cumulative digestible crude protein consumption during 1st fortnight in growing buffalo calves fed on different dietary treatments:

Table 2: Cumulative Digestible Crude Protein consumption (gm) at the end of different fortnights in growing buffalo calves.

Treatment	1st fortnight mean	2nd fortnight mean	3rd fortnight mean	4th fortnight mean	5th fortnight Mean	6th fortnight mean
Rec	4230.000±353.005[b]	8535.000±695.062[b]	13155.000±1022.443[b]	17797.500±1356.714[b]	22620.000±1690.291[b]	27532.500±2010.042[b]
IVP	6288.750±210.656[c]	13113.750±585.940[c]	20070.000±950.362[c]	26977.500±1257.876[c]	34267.500±1498.025[c]	41842.500±1717.655[c]
Gr	2355.000±183.200[a]	4530.000±205.458[a]	6566.250±400.969[a]	9292.500±669.883[a]	11918.250±858.943[a]	15120.750±1061.128[a]
CD	842.994	1745.753	2720.391	3673.639	4526.107	5336.355

Average cumulative digestible crude protein consumption (gm/day/head) were significantly different from each other (Table 2). The average cumulative digestible crude protein consumption on improved village practice treatment (6288.750 gm/day/head) was significantly higher than recommended plane of nutrition (4230.000 gm/day/head) and grazing treatment (2355.000 gm/ day/head). Statistically lowest average cumulative digestible crude protein consumption was recorded on grazing treatment.

Average cumulative digestible crude protein consumption during 2nd fortnight in growing buffalo calves fed on different dietary treatments

Average cumulative digestible crude protein consumption (gm/day/head) were significantly different from each other (Table 2). The average cumulative digestible crude protein consumption on improved village practice treatment was 13113.750 gm/day/head and was significantly higher than recommended plane of nutrition (8535.000 gm/day/head) and grazing treatment (4530.000 gm/day/head). Statistically lowest average cumulative digestible crude protein consumption was recorded on grazing treatment.

Average cumulative digestible crude protein consumption during 3rd fortnight in growing buffalo calves fed on different dietary treatments

Average cumulative digestible crude protein consumption (gm/day/head) was significantly different from each other (Table 2). The average cumulative digestible crude protein consumption on improved village practice treatment (200070.000 gm/day/head) was significantly higher than recommended plane of nutrition (13155.000 gm/day/head) and grazing treatment (6566.250 gm/day/head). Statistically lowest average cumulative digestible crude protein consumption was recorded on grazing treatment.

Average cumulative digestible crude protein consumption during 4th fortnight in growing buffalo calves fed on different dietary treatments

Average cumulative digestible crude protein consumption (gm/day/head) were significantly different from each other (Table 2). The average cumulative digestible crude protein consumption on improved village practice treatment (26977.500 gm/day/head) was significantly higher than recommended plane of nutrition (17797.500 gm/day/head) and grazing treatment (9292.500 gm/day/head). Statistically lowest average cumulative digestible crude protein consumption was recorded on grazing treatment.

Average cumulative digestible crude protein consumption during 5th fortnight in growing buffalo calves fed on different dietary treatments

Average cumulative digestible crude protein consumption (gm/day/head) were significantly different from each other (Table 2). The average cumulative digestible crude protein consumption on improved village practice treatment (34267.500 gm/day/head) was significantly higher than recommended plane of nutrition (22620.000 gm/day/head) and grazing treatment (11918.250 gm/day/head). Statistically lowest average cumulative digestible crude protein consumption was recorded on grazing treatment.

Average cumulative digestible crude protein consumption during 6th fortnight in growing buffalo calves fed on different dietary treatments

Average cumulative digestible crude protein consumption (gm/day/head) was significantly different from each other (Table 2). The average cumulative digestible crude protein consumption on improved village practice treatment (41842.500 gm/day/head) was significantly higher than recommended plane of nutrition (27532.500 gm/day/head) and grazing treatment (15120.750 gm/day/head). Statistically lowest average cumulative digestible crude protein consumption was recorded on grazing treatment.

Digestible crude protein utilization efficiency (gm DCP consumed/gm weight gain)

Digestible crude protein utilization efficiency during 1st fortnight in growing buffalo calves fed on different dietary treatments

The digestible crude protein utilization efficiency during 1st fortnight of experimentation was statistically similar on each treatment and this was due to very high coefficient of variation (213.603, Table 3). However, the best digestible crude protein utilization efficiency was on recommended plane of nutrition (0.500) and then on grazing practice treatment (1.362). The poorest digestible crude protein utilization efficiency was on improved village practice treatment (4.894). Similar findings were also observed by Kearl, Leonard 1982 [17], Yadav, J. (1986) [19], Garcia-Bojalil, M. *et al*., (1988) [27] and Malik Raman (1998) [28].

Table 3: Digestible Crude Protein utilization efficiency (DCP consumed (g)/ weight gain (g)) during different fortnights in growing buffalo calves.

Treatment	1st fortnight Mean	2nd fortnight mean	3rd fortnight mean	4th fortnight Mean	5th fortnight Mean	6th fortnight mean
Rec	0.500±0.047[a]	0.234±1.159[a]	0.941±0.346[a]	0.954±0.282[a]	1.669±0.237[b]	1.786±0.401[b]
IVP	4.894±4.023[a]	3.733±1.971[a]	2.676±1.377[a]	1.010±0.497[a]	1.094±0.166[ab]	2.107±0.392[b]
Gr	1.362±1.080[a]	0.764±0.245[a]	0.306±.049[a]	0.524±0.161[a]	.0.840±0.188[a]	0.286±0.018[a]
CD	N.S.	N.S.	N.S.	N.S.	0.585	1.050

Digestible crude protein utilization efficiency during 2nd fortnight in growing buffalo calves fed on different dietary treatments

The digestible crude protein utilization efficiency during 2nd fortnight of experimentation was statistically similar on each treatment and this was due to very high coefficient of variation (168.405, Table 3). However, the best digestible crude protein utilization efficiency was on recommended plane of nutrition (0.234) and then on grazing practice treatment (.0.764). The poorest digestible crude protein utilization efficiency was on improved village practice treatment (3.733).

Digestible crude protein utilization efficiency during 3rd fortnight in growing buffalo calves fed on different dietary treatments

The digestible crude protein utilization efficiency during 3rd fortnight of experimentation was statistically similar on each treatment and this was due to very high coefficient of variation (125.477, Table 3). However, the best digestible crude protein utilization efficiency was on grazing practice treatment (0.306) and then on recommended plane of nutrition (.0.941). The poor digestible crude protein utilization efficiency was on improved village practice treatment (2.676).

Digestible crude protein utilization efficiency during 4th fortnight in growing buffalo calves fed on different dietary treatments

The digestible crude protein utilization efficiency during 4th fortnight of experimentation was statistically similar on each treatment and this was due to very high coefficient of variation (82.696, Table 3). However, the best digestible crude protein utilization efficiency was on grazing practice treatment (0.524) and then on recommended plane of nutrition (.0.954). The poorest digestible crude protein utilization efficiency was on improved village practice treatment (1.010).

Digestible crude protein utilization efficiency during 5th fortnight in growing buffalo calves fed on different dietary treatments

The digestible crude protein utilization efficiency was significantly higher on grazing treatment (0.840) but it was statistically similar to the animals fed on improved village practice treatment (1.094, Table3). Significantly lower digestible crude protein utilization efficiency was recorded on recommended plane of nutrition (1.669) but it was statistically similar to the improved village practice treatment during 5th fortnight.

Digestible crude protein utilization efficiency during 6th fortnight in growing buffalo calves fed on different dietary treatments

The digestible crude protein utilization efficiency recorded in 5th fortnight was significantly different (Table 3). The digestible crude protein utilization efficiency (0.286) recorded on grazing practice treatment was significantly higher than the DCP utilization efficiency recorded on recommended plane of nutrition (1.786) and improved village practice treatment (2.107). The DCP utilization efficiency recorded on recommended plane of nutrition and on improved village practice treatments were statistically similar. Similar findings were also observed by Kearl, Leonard 1982 [17], Yadav, J. (1986) [19], Garcia-Bojalil, M. *et al*., (1988) [27] and Malik Raman (1998) [28].

Table 3 shows that utilization efficiency of digestible crude protein was higher on grazing treatment. This might be due to the restriction level of consumed digestible crude protein. It is supported by Ludri, RS and Razdan MN. (1980) [4] Sadrsaniya DA *et al*. (2015) [14]' Fallet, I.M. (1985); Mahmouidzadeh H *et al*., (2001) [12] and Saonze, Yadav, J. (1986) [19]. Digestible crude protein consumption (gm/day) differed significantly (Table 1). The higher crude protein consumption has been recorded on improved village practice and this was due to ample amount of green barseem and inclusion of urea. In the same way, the digestible crude protein also differed. Animals on grazing treatment have consumed DCP significantly low (135.750 gm/day/head) as compared to recommended plane of nutrition (282.000 gm/day/head) and improved village practice (419.250 gm/day/head, (Table 2-3). it is supported that Udeybir *et al*. (2000) [25, 26].

Conclusion

The most important factor in this experiment was cost of body weight gain. Significantly low cost was recorded during all six fortnight on grazing treatment. It reveals that if the animal kept on grazing, the cost of gain can be reduced drastically. Considering the demand and production of feeds and fodders available for live stock in India, grazing is the only alternative, if waste land road sides, railway track sides and bank of the rivers are utilized as a grazing field for ruminants. The small ruminant like sheep and goat, at village level in form of small herds, are still surviving on above fields by grazing.

Acknowledgement

The first authors are thankful to the Director of Research, SVBUAT, Meerut, India for the financial assistance. The authors are grateful to the Head, Department of Animal Husbandry, College of Veterinary and Animal Meerut for providing necessary facilities to carry out this work.

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