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Effect of strategic feed supplementation on growth performance and nutrient utilization in yak calves during winter

K K BARUAH[1], V PAUL[2], F U A AHMED[3], P CHAKRAVARTY[4], S DEORI[5], H SARMA[6] and A SAIKIA[7]

National Research Centre on Yak, ICAR Dirang, Arunachal Pradesh 790 101 India

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Yaks are reared under free-range system by the highlanders. The yak herdsman (Brokpas or Drokpas) collect yak during April and migrate to alpine pastures about 4,500 to 6,000 m above msl for summer grazing and during winter they move down to 3000 m above msl so that the animals live on almost same environmental conditions. In winter, yak herders stay in the village and graze the yaks in adjoining pasture lands, simultaneously grazed by sheep, hill cattle and ponies. Over grazing has resulted in the deterioration of pasture land to a great extent. Yaks are taxed heavily in winter and loss body wt 25–30% due to inadequate fodder resources (Long *et al.*1999). There are very meager information on growth performance of yak calves on feeding supplementary feed. The objective of this study was to assess the performance of yak calves on feeding complete feed block with area specific mineral mixture at mid altitude during winter.

The study was carried out at Mandala of West Kameng district of Arunachal Pradesh at 10,000 ft above msl. The West Kameng district is situated between 91°30′E to 92°40′ E longitude, 26°54′ N to 28°10′ N latitude encompasses an area of 7422 km. The lowest temperature of Mandala is being –1.08°C in January and highest temperature being 13.62°C in July with an average temperature of 4.8°C. Eighteen male calves 12–15 months of age average body wt. 153 kg belonging to 10 brokpas (yak herder) families were allocated into three groups, viz. G1, G2, and G3 of 6 calves in each group. During first 60 days of experiment, animals of each group were offered complete feed block (CFB) based on maize stover, maize stover + salix leaves and concentrate in the ratio of 50:50 (G1): 25:25:50 (G2) respectively. The third group (G3) was allowed for grazing only. All the experimental animals were fed area specific mineral mixture (Zn, Cu, Co, Mn) in the ratio of 40:20:10:10 (630 mg/d). However, during next 60 days of experiment G1 and G2 were fed same CFB as former feeding period and G3 group was fed CFB based on maize stover + salix leaves and concentrate mixture. Similar to the earlier period all the experimental animals were fed area specific mineral mixture. Yaks of G1 and G2 group were maintained throughout the trial of 120 days in a well ventilated shed and tied up individually where they can move freely. However, G3 group of yaks were tied during next 60 days of experiment in the same shed. Feed was offered in wooden mangers and were provided for each animal separately.

Maize stover and salix leaves were chaffed to the size of 1 cm approximately. The chaffed maize stover and salix leaves was then thoroughly mixed with different ingredients. The ingredient composition of CFB offered to animals in

Table 1. Percentage composition of feeds (complete feed blocks)

Ingredients	Parts	
	CFB1	CFB2
Maize stover	50	25
Tree leaves	-	25
Maize crushed	08	08
Rice polish	14	24
Ground nut cake (de-oiled)	10	05
Mustard oil cake (de-oiled)	13	08
Molasses	03	03
Lime	01	01
Salt	01	01
Vitamin AD3 @ 20g per quintal		
Proximate composition (%)		
DM	85.5	83.5
OM	89.5	87.3
CP	12.0	13.5
EE	2.1	2.6
CF	35.0	24.0
NFE	40.0	47.2
T Ash	10.5	12.7

Present address: [1]Director, [2]Senior Scientist, [3]Technical Officer, [4]Principal Scientist, [5]Scientist, [6,7]SRF ([1-4]baruah_kk @rediffmail.com); vpaul.nrcy@gmail.com; faahmed205 @gmail.com; chakravartyp@sify.com)

Table 2. Performance of grazing yak calves fed on complete feed blocks at field condition during winter

Particulars	Group T_1	Group T_2	Group T_3
Body weight gain (kg)			
Initial body weight	152.13±18.36	151.44±15.50	155.0±25.30
Final body weight at 60 days	171.53 [a]±19.52	173.31[a]±18.20	130.47[b]±21.20
Total weight gain/loss at 60 days	19.4 [a]±1.4	21.87 [b]±0.97	–25.06 [c]±3.99
Average daily gain/loss (g) during initial 60 days	327.0 [a]±23.05	366.0 [a]±15.65	–408.0 [b]±66.16
Final body weight at 120 days	193.72±18.25	196.61±16.95	155.82±22.54
Total weight gain in last 60 days	22.19 [a]±0.90	23.30 [a]±0.76	25.35 [b]±0.92
Average daily gain (g) in last 60 days	369.0 [a]±14.69	388.0 [a]±13.02	422.0[b]±15.79
Feed intake (kg)			
DMI/animal/day	3.78 [b]±0.08	4.01[b]±0.25	2.88[a]±0.34
DMI/100 kg body weight	2.38±0.22	2.42±0.10	2.52±0.14
Digestibility coefficient (%)			
DM	60.76±0.91	66.08±2.05	67.93±1.27
OM	64.34±0.51	65.91±0.91	67.35±0.52
CP	67.56±1.33	69.52±0.26	70.49±0.97
CF	60.28±0.89	56.61±1.19	56.83±1.11
EE	57.15[a]±3.66	67.27[b]±0.57	66.58[b]±0.88
NFE	59.34[a]±0.58	65.19[b]±1.55	65.91[b]±1.05

Means in a row bearing the same superscript do not differ significantly P <0.05.

each group and their proximate constituents are shown in Table I. CFB were prepared in an automatic hydraulic block making machine at 4,000 psi pressure. Each animal was offered CFB *ad libitum.* Water was offered in a bucket at 6 am, 1 pm and 4 pm. In absence of weighing balance in the inaccessible Mandala area, body weight of yak was calculated by mathematical formula for conversion of body measurement to body wt. (Barari *et al*. 1999). At the end of 120 days of feeding a digestibility trial of 7 days was conducted to determine digestibility coefficient of organic nutrient. Representative samples of CFB offered, residue left and feaces collected were analyzed for DM, CP, EE, CF and TA% (AOAC 1995). The data obtained during the experiment was subjected to statistical analysis (Snedecor and Cochran 1980).

The dry matter intake, body weight gain/loss and digestibility coefficients (%) of various nutrients are shown in Table 2. The dry matter intake (% of body weight) was almost similar in all the groups and there was no significant difference between the groups. During initial 60 days trial the CFB fed animals (G1 and G 2 groups) showed optimum gain in body weight and G3 group allowed for grazing, loss body weight (–25.06±3.99 kg). It revealed that grazing alone unable to supply adequate dry matter and other nutrients for maintaining the body weight. Xie *et al.* (1996) observed that during winter dry season digestible protein in grasses is not enough to maintain body wt. (only 55% of the requirement is met), so the yak body weight was negative during this period. During next 60 days, the gain in body weight was significantly higher in G3 group on feeding CFB 2. Live weight gain of growing yak grazing on natural grassland in Qinghai-Tibetan plateau during winter showed decreasing trend from January onwards until 2 May. This was probably due to shortage of forage supply during the winter and spring season. However, during summer and autumn the same group of yak gain in body weight 419.33 g/day (Xue *et al.* 2004) than that of reported by Xue *et al.*(1994) in which the average daily gain of feedlot yak was 247.47 g under high concentrate feeding. In the present experiment significantly higher gain in body weight in G 3 group than other group showed a high efficiency of compensatory growth, since G3 of animal was allowed for grazing during earlier 60 days thus growth was restricted due to inadequate fodder availability. Similar results were observed by Xue *et al.* (2004). The digestibility of DM, OM, CP, and CF were similar in all the groups fed different CFB with area specific mineral mixture. However digestibility of NFE and EE were higher in group G1 and G2 fed CFB prepared from maize stover, salix leaves and concentrate mixture.

Therefore, it can be concluded that yak can be fed complete feed block with adequate quantity of micro-nutrients for optimum growth during winter months of forage shortage.

SUMMARY

An experiment was conducted on 18 yak calves to study the intake, digestibility and live weight gain in yaks on feeding complete feed block with area specific mineral mixture at Mandala, Arunachal Pradesh at an altitude of 10,000 ft above msl. During first 60 days the average daily gain in body weight was similar in G1 and G2 group fed CFB and area specific mineral mixture and in G3 group the animal loss body weight 15.83% while they allowed for grazing with supplementation of area specific mineral

mixture. However, during next 60 days of experiment the average daily gain in body wt. was significantly higher in G3 fed CFB than other groups. The digestibility of EE and CF was significantly ($P < 0.05$) higher in G 2 and G3 than G1 and digestibility of DM, OM, CP, CF was similar in all the groups.

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REFERENCES

AOAC. 1995. Official Methods of Analysis. 16th edn. Association of official analytical Chemists, USDA, Washington, D C.

Barari S K, Basu A, Nandankar U A and Mohanty T K. 1999. Estimation of body wight of yak. *Indian Journal of Animal Sciences* **69**(5): 352–54.

Long R J, Zhang D G,Wang X, Hu Z Z and Dong S K. 1999. Effect of strategic feed supplementation on productive and reproductive performance in yak cows. *Preventive Veterinary Medicine* **38**: 195–206.

Snedecor G W and Cochran W G. 1980. *Statistical Methods.* 6th edn. Oxford and IBH publishing co pvt Ltd, New Delhi.

Xie A Y, Chai S T, Wang W B, Xue B, Liu S J, Zhao Y P, Zhang X W and Qiu G F. 1996. The herbage yield and nutrient variation in mountain meadows *Chinese Journal of Qinghai Animal and Veterinary Sciences* **2**: 8–10.

Xue B, Chai S T, Liu S J, Wang W B, Xie A Y. 1994. Study on protein requirement of growing yak. *Proceedings of 1st congress on yak* Pp 188. Lanzhou, China.

Xue B, Xinquan Z and Yaosheng Z. 2004. Live weight change and returned energy dynamic of growing yak grazing on natural grassland in Qinghai-Tibetan Plateau. *Proceedings of the International Congress on yak* Chengdu, Sichuan, P R China.