

Performances of lactating yaks on silage and complete feed block based feeding regiments

D MEDHI¹, S S HANAH², P P SARMAH³, KARMU TSERING⁴, E ALI⁵, P P DAS⁶, P J DAS⁷ and S M DEB⁸

ICAR- National Research Centre on Yak, Dirang, West Kameng District, Arunachal Pradesh 790 101 India

Received: 26 June 2015; Accepted: 6 July 2015

Key words: Complete feed block, Growth performance, Milk yield, Silages, Yak

Yaks are not fed any supplementary feed except some salts at regular interval. Generally milch and pregnant yaks are fed to support optimum milk production and normal foetal development (Chatterjee 2003). In long cold season (Nov–Jun), yaks suffer from inadequate feeding due to shortage of herbages under the traditional farming system, resulting in big seasonal body weight losses (25 to 30 %), low milk production and fertility (Baruah *et al.* 2012). Therefore, people related with yak rearing, living in Qinghai–Tibetan, Plateau describe yak “alive in summer, strong in autumn, thin in winter and tired in spring” and this can also be applicable in India, though the length of winter here is somewhat shorter. The average milk yield / cow a day is around 1.3 ± 0.6 kg and the milking period from calving lasts for 110–130 days. These situations suggested that there is a big potential to improve yak productivity through developing roughage sources and supplements for cows during winter as concentrates are not fed to them besides over-grazing owing to competition of different livestock on summer pasture and snowfall during winter also results in deterioration of pasture. There is little information available, particularly in using conserved roughages to feed yaks for improvement of their productive and reproductive performances. However, maize, the most potential fodder of the hilly areas, become abundantly available in NE regions of the country and could be conserved through ensiling for feeding the livestock during scarcity. Hence, the present study was conducted to observe the effect of ensiled and densified forages on milk yields and retention of body weights in lactating yak cows.

The study was conducted at Nyukmadung farm of National Research Centre on Yak, West Kameng district of Arunachal Pradesh situated at 7,500 ft above msl. Lactating yaks (16) of uniform parity (second and third) and body

weights were randomly divided in to 4 groups of four animals each namely T₁, T₂, T₃ and T₄ and fed individually for 112 days with maize stover based complete feed blocks (CFB-T₁), maize silage with and without concentrates (T₂ and T₃) and free grazing (T₄), respectively. The dry matter intake of the experimental animals under T₁, T₂ and T₃ were calculated from the differences of the daily feed offered and voided and for grazing yaks (T₄) was calculated by using formula given by Minson and McDonald 1987. The daily milk yield and fortnightly body measurements were recorded to evaluate the changes in milk yields and body weight of the animals. The data were subjected to statistical analysis (CRD design) as per Snedecor and Cochran (1986).

The data on the physical and chemical compositions of the complete feed blocks, silages and concentrate mixtures used for the study have been presented in table 1 and their chemical compositions observed to be within the marginal level. The average daily gain in body weight calculated on

Table 1. Physical and proximate compositions of the experimental diets used for lactating yaks

Attributes	CFB (maize stover 50+ conc. mixture 50)	Concentrate mixture	Maize silage
Maize stover	50	-	
Maize crushed	08	36.00	
Rice polish	15	20.00	
Wheat bran	-	15.00	
Ground nut cake	10	10.00	
mustard oil cake	13	16.00	
molasses	03	2.00	
Common salt	01	1.00	
Cost per kg (Rs)	16.03	26.16	8.00
Proximate compositions (% DM basis except DM content)			
DM	85	87.86	37.68
OM	89	90.30	91.08
CP	12.0	17.61	9.82
EE	2.1	4.38	2.69
CF	35.0	7.12	22.54
NFE	40.0	61.22	56.03
T. ash	10.5	9.70	8.92

Present address: ¹Senior Scientist (dinamanimedhi@gmail.com), Animal Nutrition, ²Scientist (stephenhanah@gmail.com), LPM, ^{3,5}SRF(pranabpratim90@gmail.com), (alieyashin@gmail.com), ⁴Research Assistant (karmutsering5@gmail.com), ⁶Research Associate (dpartha21july@gmail.com), ⁷Senior Scientist (drpranabjyotidas@gmail.com), AGB, ⁸Director (sm_deb@yahoo.com).

Table 2. Performance of the lactating yaks fed different dietary regiments

Particulars	Group T ₁	Group T ₂	Group T ₃	Group T ₄
Gain in weight				
Initial body weight (kg)	206.79 ±8.36	215.38 ±2.06	216.47 ±10.62	206.50 ±3.86
Final body weight at 112 days (kg)	214.58 ^a ±8.43	228.26 ^a ±1.64	223.33 ^a ±11.69	192.64 ^b ±6.02
Total weight gain/loss at 112 days (kg)	7.80 ^b ±0.38	12.87 ^a ±1.45	6.86 ^b ±1.38	-13.85 ±3.41
Average daily gain (g)	0.07 ^b ±0.00	0.11 ^a ±0.01	0.06 ^b ±0.01	-0.12 ±0.03
% of body weight gain/loss	3.77	5.98	3.17	-6.71
Dry matter intake/animal				
Dry matter intake (kg/day)	5.12 ^b	5.29 ^b	6.07 ^c	3.88 ^a
Dry matter intake (kg/100kg body weight)	2.39 ^b	2.32 ^b	2.72 ^c	2.01 ^a
Dry matter intake (g/kg W ^{0.75} body weight)	91.31 ^b	90.07 ^b	105.07 ^c	75.04 ^a
Milk yield (kg)				
Total yield (kg) (112 days)	102.13 ^b ±5.62	103.61 ^b ±8.38	93.45 ^b ±12.51	40.60 ^a ±5.87
Milk (kg/day)	0.91 ^b ±0.05	0.94 ^b ±0.07	0.83 ^b ±0.11	0.36 ^a ±0.05
Economics of feeding				
Absolute (Rs/kg milk yield)	90.19 ^c	78.99 ^b	58.51 ^a	-
Relative (%)	100 ^c	87.58 ^b	64.87 ^a	-

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

the basis of the body measurements varied among the groups and values changed negatively in group T₄ (-0.12±0.03 kg/day) that was not fed supplementary feed (Table 2) and recorded a reduction of body weight of 6.71 % of the initial body weights. Loss in body weight of the yaks reportedly ranged from 16.17% (Baruah *et al.* 2012) to 25–30% (Long *et al.* 1999). The digestible protein content of winter dry grasses could maintain only 55% of the maintenance requirements in growing yaks leading negative balances of body weights in yaks (Xie *et al.* 1996). The decreasing trends of live weights gain in growing yaks on natural grasslands of Qinghai-Tibetan plateau from January to May, but the same could gain @419.33g/day during summer and autumn (Xue *et al.* 2004).

Dry matter intakes (DMI) in lactating yaks ranged from 3.88 to 6.07kg, 2.01 to 2.72kg and 75.04 to 105.07g, respectively, per day, per 100 kg body weight and per kg metabolic body weight. However, the dry matter intakes in yaks also depend on the type of feed resources. Feeding feed blocks with area-specific mineral mixture could supply adequate nutrients to yaks for supporting optimum growth rate during winter (Ghosh and Chatterjee 2011a, Ghosh and Chatterjee 2011b). They recorded the DMI in growing yaks

ranged from 2.17 to 2.70kg/100kg body weight. Basu *et al.* (2005) reported the DMI as 2 % of their body weight in adult yaks weighing on an average body weight of 212 kg, maintained under grazing when the study was conducted at an altitude of 4,242 m above sea level. They also reported that the yak cows need extra feed to meet their requirement for milk yields; moreover the lactating yaks consumed more feed at low temperature. Liu *et al.* (1997) observed the dry matter intake in grazing yaks as 3.8 and 3.9 kg/day, 3.01 and 3.38 kg/100 kg and 101 and 111g/kg metabolic body weight, respectively, when they were maintained on mature and premature forages, respectively.

The daily milk yields of the yak cows were significantly higher in group T₂ fed maize silage with *ad lib.* concentrate mixtures (0.94±0.07 litre / day) than the other groups with lowest yields observed in group T₄ that fed solely on free grazing (0.36±0.05 litre / day). There was reduction in milk yield but not complete cessation hence, there is need to supply small amounts of concentrates in the form of wheat flour or maize flour etc. to support optimum milk production and normal foetal development (Chatterjee 2003, Chai *et al.* 2004). The cost of feeding in terms of per kg milk yields was significantly reduced in group T₃ than that of other experimental groups (35.15% less compared to T₁ group that were fed complete feed blocks).

Study revealed feeding of silages with or without supplementation of concentrates and complete feed blocks (CFB) has beneficial effects in lactating yaks during winter both in terms of retention of loss in body weights and milk yields.

SUMMARY

An experiment was conducted on lactating yaks at Nyukmadung farm under ICAR. Lactating yaks (16) of uniform age and parity (second and third) and body weights were randomly divided into groups T₁, T₂, T₃ and T₄ of 4 animals each and fed individually for 112 days with maize stover based complete feed blocks (CFB-T₁), maize silage with and without concentrates (T₂ and T₃) and free grazing (T₄), respectively. The average daily gain in body weight varied among the groups and values changed negatively in animals of T₄ that were fed no supplementary feeding. The cost of feeding in terms of per kg milk yields was significantly reduced in group T₃ than that of other experimental groups. Study revealed silage feeding with or without supplementation of concentrates and complete feed blocks (CFB) have beneficial effects in lactating yaks during winter.

ACKNOWLEDGEMENT

The authors are thankful to the Director, Indian Council of Agricultural Research-National Research Centre on Yak, West Kameng, Arunachal Pradesh for providing the financial help and infrastructure facilities to undertake the study.

REFERENCES

Baruah K K, Paul V, Ahmed F A, Chakravarty P, Deori S, Sarma

- H and Saikia A. 2012. Effect of strategic feed supplementation on growth performance and nutrient utilization in yak calves during winter. *Indian Journal of Animal Sciences* **82**:220–22.
- Basu A, Chatterjee A, Baruah K K and Bhattacharya M. 2005. Voluntary feed intake and live weight gain in yaks (*Poephagus grunniens* L.) grazed on high altitude grassland. *Indian Journal of Animal Sciences* **75**: 81–83.
- Chatterjee A. 2003. Feeding Management of Yaks. *North East Veterinarian* **3**: 18.
- Chai S T, Liu S J, Xie A Y, Zhao Y P, Zhang X W and Qiu G F. 1996. Study on utilization rate of feed nitrogen content in growing yak. *China Herbivores* **4**: 36–39.
- Ghosh M K and Chatterjee A. 2011a. Nutrient Digestibility and live weight change in yaks fed maize stover based complete feed block during winter. *Indian Journal of Animal Sciences* **81**: 427–28.
- Ghosh M K and Chatterjee A. 2011b. Effect of feeding complete feed block on nutrient digestibility and liveweight gain of yak. *Indian Veterinary Journal* **88**: 81–82.
- Liu S J, Xie A Y, Wang W B, Xue B and Hu L H. 1997. Study on the forage intake at different phenological periods in grazing yak. *Journal of Qinghai Animal Husbandry and Veterinary Medicine* **27**: 4–8.
- Minson D J and McDonald C K. 1987. Estimating forage intake from the growth of beef cattle. *Tropical Grassland* **21**: 116–22.
- Snedecor G W and Cochran W G. 1986 *Statistical Methods*, 8th edn. Iowa State University Press, Ames, Iowa 50010.