Yak Rearing on High Altitude Pastures of Northeastern Himalaya of India: Their Utilization Strategies and Rejuvenation

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Introduction

Yak rearing on alpine pastures is the main occupation of the highland pastoral nomads (*Brokpa* and *Dokpas*) of north-east (NE) India. These pastoral nomads living in the remote mountains solely rely on high altitude pastures for their nutritional and livelihood security because of virtual existence of agricultural activities in this area. They rear yaks under transhumance and utilize various pastures while migrating from low land winter pastures to high altitude alpine pastures during summer. Therefore, the temperate and alpine pastures are the major feed resources for the yaks. The indiscriminate use of pastures and impending climate change results in their degradation that may affect the productivity of the animals reared on them. In this study, an attempt was made to evaluate the status of pastures used for yak rearing in NE India and an initiative has been taken to test the adaptability of palatable high yielding temperate grasses for pasture development and rejuvenation.

Materials and Methods

A survey was conducted to assess the status of alpine and temperate pastures and yak rearing practices of northeast Himalayan region of India (*i.e.* Arunachal Pradesh and Sikkim). Samples of pasture biomass (composite grasses) and fodder trees of different yak rearing areas were collected and evaluated for their nutritional composition. To assess the adaptability and biomass production potential of high yielding temperate grasses and legumes for establishing and rejuvenating the degrading pastures, experimental plots were developed at different field sites, varying from 1850m to 3650m altitude in yak rearing areas of Arunachal Pradesh and Sikkim.

Results and Discussion

Field survey revealed that the yak rearing pastoral nomads (*Brokpas and Dokpas*) practices two-pasture utilization strategy *viz.*, summer and winter pasture grazing. Yaks graze at summer pastures from May to September, when high altitude pastures are lush after melting of snow and onset of full vegetative growth of the herbages. During winter (October to March), high altitude ranges are covered under snow and animals return to low altitude pastures and graze the partially dried biomass of temperate grasses, shrubs and fodder trees (Chatterjee, 2003). It was also observed that the quality of high altitude pastures is degrading due to increased livestock pressure per unit pasture area, over grazing, infestation of unpalatable wild weeds (*Rumex spp.*), indiscriminate use of pastures and changing climatic scenario.
Some of the natural edible grass species found in yak rearing region of NE-India are *Kyllinga monocephala*, *Poa annua*, *Fimbristylis squarrosa*, *Eragrostis spp. Alopecurus spp.*, *Pogonatherum crinitum*, *Eriochloa spp.* etc. The proximate composition of the pooled pasture grasses collected from different yak tracts of Arunachal Pradesh is given in Table 1.

Table 1 Average per cent proximate composition of pasture grass biomass (DM basis) collected from different natural pastures of Arunachal Pradesh

Pasture location	Altitude (m above msl)	OM (organic matter)	CP (crude protein)	CF (crude fibre)	EE (ether extract)	TA (total ash)	NFE (Nitrogen free extract)
Mandala Phudung	2800	91.42±1.25	9.58±2.54	18.50±1.22	2.86±1.21	8.58±0.63	60.48±0.85
Lubrang	3000	97.60±0.79	5.35±3.10	20.85±2.00	1.12±1.10	2.36±1.09	70.32±1.02
Chander	3000	92.91±1.96	12.06±5.33	23.57±3.24	2.92±0.57	7.09±1.96	54.35±0.48

Basu *et al.* (2005) also reported similar values for the average crude protein; ether extract and crude fibre contents of 11.9, 1.65 and 22.89%, respectively for the composite pasture herbages of Sela-pass (at 4242m above msl) in Arunachal Pradesh. They identified fourteen grass species and no legume growing on the grassland extensively grazed by the yaks.

Hills of north-eastern Indian Himalayas are endowed with various species of fodder trees. Yaks are fed with the fodder tree leave during winter feed scarcity. Some of the commonly used fodder trees are *Buddleja asiatica, Symplocos racemosa, Salix humboldtiana, Acer cambelli, Costanopsis spp., Ligustrum myrsinites, Acer hookeri, Berberis spp., Quercus wallichiana, Embelia spp., Artocarpus lakoocha, Ficus spp., Reevesia pubescens, Bambusa spp.* etc. Among these fodder trees, *Salix* is fast growing tree that can also be grown at high altitude arid region along with other shrubs. The average crude protein content of fodder tree leaves varied from 6.81 to 19.43 % (DM basis) and the highest values were found in *Quercus wallichiana* and *Reevesia pubescens* (Paul *et al.*, 2010).

To assess the adaptability and biomass production, various temperate grasses and legumes *viz*., cocksfoot *(Dactylis glomerata),* perennial ryegrass *(Lolium perenne),* tall fescue (*Festuca arundinacea*), Timothy (*Phelum pretense),* white clover (*Trifolium repens*) and red clover (*Trifolium pretense) were* tested in experimental plots. Results of experimental trial revealed that *Dactylis glomerata* was the most suited, fast growing and high yielding temperate grass. Biomass yield of *Dactylis glomerata* grown in experimental plots at different locations is depicted in Table 2. Whereas, *Lolium perenne* and *Trifolium repens* were the other grass and legume species that were comparatively low yielding, but suitable for establishing grass-legume based pastures.

Table 2: Adaptation, growth and biomass yield (first cut) of *Dactylis glomerata* grown in different experimental plots

Location	**Altitude (msl)**	**Average number of stems per plant hill**	**Average plant height (in inch)**	**Fresh biomass (kg/m^2)**	**Plant growth and adaptation**
Rabum, North Sikkim	1850 m	24	21.0	0.160	Excellent
Lachung, North Sikkim	2600 m	18	18.0	0.132	Good
Zeema, North Sikkim	3000 m	23	18.0	0.140	Very good
Yhathang, North Sikkim	3650 m	6	7.0	-	Poor growth
Lhagyala Gonpa, Arunachal Pradesh	2800 m	26	30.9	0.273	Excellent
Merkmu, Arunachal Pradesh	3000 m	56	29.6	0.825	Excellent

Conclusion

It is concluded that the alpine and temperate pastures are major feed resources for yaks reared by transhumant nomads. Therefore, degrading high altitude pastures could be rejuvenated by introducing suitable temperate grasses and legumes species like *Dactylis glomerata*, *Lolium perenne* and *Trifolium repens* for sustainable yak husbandry practices. Lower altitude pastures could be rehabilitation by establishing silivo-pastures with suitable fodder trees to supplement feed for yaks during winter scarcity period.

References

Basu A., A. Chatterjee, K.K. Baruah and M. Bhattacharya. 2005. Voluntary feed intake and live weight gain in yaks (*Poephagus grunniens* L.) grazed on high altitude grassland. *Indian J. Anim. Sci.* 75: 81-83.

Chatterjee A., 2003. Feeding management of yaks. *North East Veterinarian.*3: 18.

Paul V., S. Maiti, J. P. Singh, M. K. Ghosh, K. K. Baruah, and R. S. Chaurasia. 2010. Geomatics based study of yak rearing tracks of north-eastern Himalayan grasslands. *Range mgmt. & Agroforestry (Symposium issue)* A: 107-109.

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