Fodders and feeding practices of cattle and sheep in Kashmir (India)

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Accepted 02nd July 2002

ABSTRACT

Survey on feed and fodder resources, their acceptability, common feeding practices and proximate analysis of tree leaves and aquatic vegetations used as fodder in Kashmir valley situated in the middle greater North Western Himalayas was undertaken. A total population of 2243 cattle and 5373 sheep randomly selected from 200 households in ten villages of Kashmir valley constituted the sample population for the investigation. Five interesting features of traditional and popular feeding practices in rural Kashmir were: migration of livestock on grazing pastures in summer and autumn months, their confinement to basement animal sheds in severe winter, fodder scarcity during the winter months and feeding paddy hay supplemented with aquatic vegetation/tree leaves to livestock with occasional incorporation of concentrates by progressive farmers to meet nutritional requirements have been unique feature of animal husbandry practices. Proximate analysis indicated higher nutritive value of aquatic vegetations, (devoid of antimetabolites/antinutritional factors) than fodder tree leaves. A solution for fodder scarcity, and the stunted growth and/or lowered productivity of ruminants, was found by timely harvesting and conservation of aquatic vegetations, treatment of fodder tree leaves for antimetabolites, besides enrichment/supplementation with non-protein nitrogen (NPN), and with minerals/vitamins of horticultural and agro waste products and their exploitation for livestock feeding on scientific lines.

Key words : Feed and fodders, Feeding practices, Aquatic vegetations, Tree leaves

INTRODUCTION

Several states of India have been facing problems of inadequate fodder to sustain large livestock population (Ranjan, 1995). However, in Jammu and Kashmir, available natural fodder resources from forests, alpine pastures, orchards, aquatic vegetations and pastures on hilly slopes are in excess of 3.2 hundred thousand metric tonnes over fodder requirements, for sustaining the state livestock population; yet the productivity of ruminants in the state is below the national average (Tomar and Lall, 1992). Macro and micro geoclimate in the region influence the availability, utilization of fodder and diversified resource based feeding practices (Tomar and Lall, 1992; Ranjhan, 1995; Singh, 1995). Nutritive values of fodders, feeding practices, pasture managements and prevalence of gastro-intestinal parasitism, etc. also influence animal productivity (Holmes, 1993). In an effort to investigate causes of lowered animal productivity in Kashmir, observations were made and data analysed on the nutritional value of traditionally offered forages and aquatic vegetations. This communication deals with common feeds and fodders fed to livestock, feeding practices and documents proximate principles of common tree leaves and aquatic vegetations used as animal fodder in Kashmir.

MATERIALS AND METHODS

The survey was restricted to Srinagar and Budgam districts of Kashmir valley, located at 80° - 40" to 34° -20" north latitude and 74° -25' to 75°-30' east longitude. The study area, in the north east included Kargil, in north west Baramulla and in south the Anantnag districts. About 30 per cent of the rural population earn livelihood by rearing cattle and sheep. Twenty randomly selected households from ten villages (having 2243 cattle and 5373 sheep) in the study area were paid three regular visits during different seasons of the year for collecting on spot oral informations regarding common feeding practices and various types of feeds, fodders etc. offered to livestock.

Adequate quantities of feeds and fodder samples, at flowering stage, were collected, preserved and identified from published reports on ecological distribution of Botanical fauna (Kachroo, 1976) and were subsequently confirmed at the Department of Botany, University of Kashmir, Srinagar. The samples were analysed for proximate principles following standard techniques (AOAC,

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1980). The data were analysed statistically (Snedecor and Cochran, 1968).

RESULTS

Feeds, fodder resources and their acceptability

An analysis of information on available fodder from various sources in Kashmir vis-a-vis estimated fodder requirements for the entire population of livestock, revealed that the valley has surplus fodder production which exceeded by 3.2 hundred thousand metric tonnes over estimated requirements (4.92 million metric tons). Fodder tree leaves alone contributed 76.8%, to state fodder resources, followed by paddy hay [11.5%]. Cultivated fodders [Oats, maize, natural pastures, aquatic vegetations, straws and stovers altogather contributing 11.7% to state resources. The common feeds and fodders fed to ruminants in Kashmir and their acceptability are summarised in Table 1.

Table 1. Common feed and fodders fed to ruminants and their acceptability

Fodder species	Livestock					
	Cattle			Sheep		
	No.	(%)*	Acceptability	No.	(%)*	Acceptability
Cultivated fodders						
Paddy hay	1948	86.9	+	4586	85.4	+
Oats	543	24.2^{b}	+++	664	12.4^{a}	+++
Maize	139	6.2	++	323	6.4	+
Berseem	32	3.7	+++	263	4.9	+++
Fodder tree leaves						
Willow	261	11.6^{a}	+	4972	92.5^{b}	+++
Robinia	194	8.7^{a}	+	4394	81.8^{b}	+++
Alanthus	545	24.3^{a}	++	1737	32.3^{b}	++
Others**	80	3.6^{a}	+	1709	31.8^{b}	++
Aquatic vegetations						
Typha angustata	192	8.6^{b}	++	126	2.3^{a}	+
Phragmites elephantoides	182	8.1^{b}	++	69	1.3^{a}	+
Nymphaea tetragona	429	19.1^{b}	+++	634	11.8^{a}	++
Paddy field herbage						
Lowe grass (Hypoxis hirsuta)	891	29.7^{a}	+++	2872	53.5^{b}	+++

* Percent of surveyed population
** Include Celtis, Quercus, Mulberry and Popular tree leaves
** Lowe grass (*Hypoxis hirsuta*) sun-cured grass rolled into ropes
Value bearing different superscripts in a row differ significantly (P<0.01)

Feeding of tree leaves (dry/green), paddy hay, sun cured dry paddy field herbage (Lowe grass) is the common traditional feeding practice of livestock owners (marginal farmers and landless labourers) during autumn, winter and early spring season [November to March]. In summer and rainy months [April to October] cattle were left to graze on natural hill slope pastures around villages while sheep migrated long distances to high alpine pastures. A small proportion of progressive farmers offered cultivated fodders and crop residues / horticultural waste besides concentrates to their livestock.

Stall-fed cattle, in general, were provided with cultivated fodder (oats) whereas sheep were maintained mainly on tree leaves in addition to paddy hay fed to both species [Table 1]. Though tree leaves were not palatable to cattle, Robinia *{Robinia pseudoacacia)* and Willow *(Salix tetragonal* > leaves constituted a highly palatable fodders for sheep($P<0.01$). Feeding of aquatic vegetations, harvested from fresh water lakes, to cattle was popular in villages around Srinagar city and had good prospects for its exploitation as fodder for ruminants. Lowe *(Hypoxis hirsuta),* a sun-cured grass and rolled into ropes, harvested from paddy fields during summer and rainy seasons, was used for feeding in winter to all species of ruminants and was highly palatable for cattle and sheep (Table 1).

Feeding practices

Three types of climate based feeding practices were popular in Kashmir valley [Table 2]. Except for summer months, cattle were either stall-fed or let - loose for grazing paddy harvested fields and/or foot hill pastures around villages. Sheep flocks were observed migrating for long distances (60-300 km) towards high alpine pastures during summer. Migration of cattle was restricted to near-by hill slopes only. During January to April, all types of livestock were confined to basements of houses and this was the period when severe shortage of fodder was faced by the livestock owners. To overcome this

Table 2. Feeding practices of livestock in Kashmir

Period	January - April				May - August				September - December			
	Cattle		Sheep		Cattle		Sheep		Cattle		Sheep	
	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*
Stall feeding	1949	86.9	4501	83.7	1670	74.4^{b}	404	7.5	630	72.7^{b}	1884	35.1^{a}
Pasture Grazing	294	13.1	872	16.3	372	16.6^{a}	738	13.7^{a}	539	24.0^{a}	1929	35.9^{b}
Alpine pasture gazing	_	_	_	_	201	9.0^{a}	4231	78.8^{b}	74	3.3^{a}	1560	29.0^{b}

* Of surveyed population
values bearing different superscripts within the period differ significantly (P<0.01)

shortage, they stored "lowe grass" and "dried tree leaves" during autumn, to meet bulk fodder requirements in winter (lean season). This was a unique traditional practice, popular in Kashmir. Details about feeding practices during lean season are given in Table 3.

Table 3. Feeding practices during lean season in Kashmir

Practice	No. of families	Animals surveyed			
		Cattle		Sheep	
		No.	%	No.	%
Special feeding	120	1449	64.6	3284	61.1
Tree leaves and lowe grass	161	90	4.1[a]	4537	84.4[b]
Paddy hay	154	1752	78.1	4009	74.6

Value bearing different superscripts in a row differ significantly No.

PROXIMATE ANALYSIS

Tree leaves

Proximate analysis of popularly fed tree leaves is given in Table 4. Dry matter (DM) content was the highest (37.6 to 45.7%) in tree leaves harvested during November, followed by August [31.0 to 43.2%]. It was lowest (27.3 to 36.8%) in tree leaves harvested during May. The dry matter contents was highest in Alanthus and lowest in Willow leaves. The differences were significant (P>0.05).

The crude protein (CP) was highest in Robinia, followed by Alanthus and Willow and lowest in Celtis (Table 4). CP was highest in leaves harvested during May and lowest in leaves and in tender branches of trees prunned during November. The CP values on DM basis varied from 16.2 to 22.9, 15.2 to 16.4, 10.1 to 22.7 and 6.0 to 13.0 per cent in Robinia, Salix, Alanthus and Celtis leaves, respectively. It was interesting to note that in Kashmir, the stage of prunning trees did not influence CP content of Salix and Alanthus leaves as evidenced from almost similar values of these parameters during August and November.

The nitrogen free extract (NFE) was highest in Alanthus leaves (57.4%), followed by Robinia (52.5%) and Celtis (52.4%). The lowest value of NFE was observed in Willow leaves. Stage of prunning of the leaves did not alter NFE values in different trees significantly. The total ash content was highest in Celtis (23.2%), which was followed by Alanthus (14.0%), Salix (11.7%) and the lowest in Robinia (10.7%). Crude fibre (CF) was highest in Willow (27.3%) and lowest in Alanthus (7.45%). Robinia and Celtis had CF values between 10 to 12 per cent. The ether extract (EE) was lowest in Willow and highest in Robinia leaves (Table 4).

Aquatic vegetations

Feeding of water weeds at flowering stage specially to cattle during summer to autumn season is a unique and popular animal feeding practice in rural Kashmir. These vegetations belonged to genus *Nymphaea, Carex* and *Phragmites* and were obtained from fresh water bodies (lakes) located in the suburban areas of Srinagar city and other towns of Kashmir. Proximate analysis of samples revealed that DM contents were higher (20.5-40.0%) during August-September than May-June harvests (11.1-41.8%). The DM of *Phragmites elephantoides,* however, did not vary (40.0-41.8%). Aquatic vegetation of *Nymphaea spp.* seems highly nutritious as revealed by proximate analysis (CP 19.4, NFE 55.4 and total ash 11.7%). Although the nutritive values of *Carex spp.* and *Phragmites spp.* were not comparable with *Nymphaea spp.,* yet these were far better than traditional feeds and fodder offered to livestock in Kashmir (Table 4).

DISCUSSION

The data generated from this study brought out the following five interesting features about traditional and popular feeding practices in rural Kashmir viz. (a) Migration of cattle is restricted to hill-slopes grazing land around human habitats where as sheep flocks migrate to far away distances and thrive on

Table 4. Proximate analysis of prevalent fodder tree leaves and aquatic vegetations

	DM	CP	EE	CF	NFE	Total ash	Silica
Tree leaves							
Robinia	39.9 ± 3.01	18.5 ± 1.34	7.2 ± 0.95	10.9 ± 2.32	52.5 ± 2.69	10.7±1.36	2.3±1.06
Willow	37.6 ± 4.83	15.8 ± 1.34	3.6 ± 0.96	27.3 ± 4.19	42.6 ± 5.20	11.7 ± 0.81	1.4 ± 0.33
Alanthus	40.4 ± 2.08	15.9 ± 3.67	5.2 ± 1.19	7.5 ± 1.69	57.4 ± 2.45	14.0 ± 4.06	2.4 ± 1.14
Celtiss	39.6 ± 4.86	9.5 ± 1.84	2.4 ± 0.67	12.0 ± 2.10	52.9 ± 1.84	23.2 ± 4.06	7.6 ± 2.55
Aquatic vegetation							
Nymphaea spp.	23.7 ± 3.39	19.4 ± 2.86	3.1 ± 0.87	10.3 ± 1.66	55.4 ± 0.88	11.7 ± 1.22	0.9 ± 0.35
Carex spp.	15.8 ± 4.71	10.8 ± 2.04	6.7 ± 0.02	29.1 ± 6.96	47.2 ± 4.32	6.3 ± 0.59	1.1 ± 0.12
Phragmites spp.	31.6 ± 5.58	13.5 ± 0.82	4.3 ± 2.19	34.2 ± 1.79	39.9 ± 3.39	8.3 ± 0.75	2.1 ± 1.38

alpine pastures during May to September-October months, (b) All species of livestock remain confined to basement sheds and they are invariably stall-fed during severe winter months, (c) Paddy hay meet the bulk fodder requirements for stall-feeding. This is supplemented with tree leaves for sheep and aquatic vegetations for cattle, (d) Livestock owners face acute scarcity of feeds and fodders for their livestock, particularly during severe winter despite rich feeds and fodder resources available in the valley, and (e) Special feeding for high yielders has been popular practice amongst progressive farmers, who can afford its cost. There is an urgent need for conservation of agro-wastes, their processing and supplementation and / or enrichment with non protein nitrogen sources, minerals and vitamins, to overcome fodder scarcity problems currently faced by livestock owners, particularly during lean season.

A comparison of proximate analysis values in respect of CP, CF, EE, NFE, total ash and silica for fodder tree leaves as well as aquatic vegetations, offerred as animal fodder, with crop residue (paddy straw) revealed that the traditional fodders supplementation with aquatic vegetation and tree leaves by the farmers have been more nutritious than cultivated fodders (paddy straw, wheat straw, oats and berseem etc.). Considering acceptability, tree leaves were less palatable and had inherent limitation of anti-nutritional factors which required to be thorough processing detoxified prior to its consumption by livestock. Aquatic vegetations were more palatable and free from any problem of anti-metabolite. Probably lack of awareness among livestock owners about nutritive values of aquatic vegetations had been the sole limitation in their exploitation as feed and fodder for ruminant livestock.

Amongst aquatic vegetations, as revealed from proximate analysis (Table 4) *Nymphaea spp.* had the highest nutritive values on account of least CF and silica contents and highest values for NFE, CP and total ash. Animals fed upon this vegetation may not require concentrate supplementations. This was followed by *Carex* and *Phragmites spp.* Consumption of these vegetations as fodder with a little amount of bran will meet nutrients requirement. This can substantially reduce the cost of livestock production by avoiding costly concentrate feeding. This seems first report on proximate analysis of aquatic vegetations used as livestock fodder in Kashmir valley.

The proximate analysis of various tree leaves showed that their nutritive values were higher than the popular cultivated fodder crops/crop residues/agro-industrial wastes (Sen *et al.* 1978) but these were less nutritious than aquatic vegetations. However, feeding of tree leaves could not become popular on account of anti-metabolites present in them (Gupta, 1981; Balaraman, 1981). Treatment of tree leaves for presence of anti-nutritional factors, their supplementation with aquatic vegetations and/or conventional cultivated fodders/crop residues/agro-industrial by-products and enrichment with vitamins require further detailed investigations and metabolism trials to formulate recommendations on scientific lines for improved feeding practices in Kashmir valley.

The survey data generated from two hundred households, covering a total livestock population of 5373 sheep and 2343 cattle have indicated that, despite higher fodder production potential of the state, the general nutritional status of livestock is far from satisfactory. Obviously, animals are either not properly fed or a large quantity of feed and fodder resources are being wasted due to lack of awareness/interest in timely harvesting the fodder or its proper preservation/storage for lean period. Huge quantities of fodder tree leaves, mostly consumed by sheep, are often used in the preparation of *'Kangri charcoal'* during winter as fuel for warming. Similarly, aquatic vegetations although nutritious fodder to cattle population around large sized fresh water bodies (lakes), is neither fully harvested nor properly used for livestock feeding during winter months. Thus, livestock population thrives mostly on paddy hay during severe winter months and hill-slopes pastures (cattle) or alpine pastures (sheep) during warmer months of the year. Climatic stress on livestock, lack of awareness amongst livestock owners about modern animal husbandry practices and heavy worm infestation could be the other possible causes for apparent poor nutritional status of the livestock as reported for hilly regions elsewhere (Balaraman, 1981; Gupta, 1981). In general, the livestock had stunted growth with delayed onset of puberty, which may have been due to a sum total consequences of interacting factors, viz their genotype, wide spread parasitic infections and poor nutritional standards (Tomar and Arora, 1982).

ACKNOWLEDGEMENTS

Authors thankfully acknowledge the generous help received from Dr. O.K. Raina and Prof. M. Javed, University of Kashmir, Srinagar (J&K) in identification and confirmation of feeds and fodders.

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