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Assessment of feeding practices, nutritional status and gap for dairy buffaloes in hilly districts Tehri Garhwal and Pithoragarh of Uttarakhand, India

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ABSTRACT

The present study was undertaken to assess season-wise feeding practices, availability, requirement, and nutritional gap of dairy buffaloes in Tehri Garhwal and Pithoragarh districts of Uttarakhand in year 2011–12. Feed samples were chemically analysed for proximate principles. Daily dry matter intake (DMI), crude protein (CP), metabolisable energy (ME), and nutritional gap were calculated. Results showed that both in Tehri Garhwal as well as in Pithoragarh, the lactating buffaloes were underfed in terms of quantity (DM).In Tehri, the shortage of dry matter was in the range of 25%, whereas protein shortage was 19% and energy deficit 17.3%. In Pithoragarh district the shortages were 27% (DM), 27% (CP) and 18.6% (ME). The approach of 'utilize better' (improving the quality of present feed stuffs), 'produce more' (increasing biomass production) and 'import' (bringing nutrient supplements) could be resorted to fill the nutritional gap and optimize milk production in both the districts.

Key words: Feeding practices, Nutritional evaluation, Nutritional gap

Nutrition, in general, remains the most critical constraint to increase animal productivity with the perpetual gap between demand and supply of digestible crude protein and total digestible nutrients (ILRI 1995). Difference between availability and quality of feedstuffs in various seasons in different locations is one of the reasons leading to nutrient shortages or surpluses. In a state like Uttarakhand, the issue is far graver in the hills as feed and fodder markets are mainly concentrated in the plains. The current information on feed availability in Uttarakhand for different locations in different seasons is very scanty. The present study was therefore undertaken to assess season-wise availability, requirement and nutritional gap of lactating buffaloes in Tehri Garhwal and Pithoragarh districts of Uttarakhand.

MATERIALS AND METHODS

The present research was conducted in year 2011–12 in two blocks, namely, Jhakhanidhar (altitude 1500–1700 AMSL) and Gangolihaat (altitude 1600–1750 AMSL) of districts Tehri Garhwal and Pithoragarh respectively and was confined to (dairy) buffaloes considering their prevalence in the area (15.1% of state buffalo population, and 5.33% of state dairy livestock population). Relevant information was collected from 20 farmers (10 from block Jhakhanidhar and 10 from Gangolihaat) in three consecutive seasons (summer, rainy and winter). Body weight, feed intake, and milk yield were recorded for individual animals of the 20 farmers during the study. Body weight was estimated using Shaeffer's formula.

Feed samples were collected, pooled and chemically analysed for proximate principles as per Association of Official Analytical Chemists (AOAC 1995). Daily intake of dry matter (DM), crude protein (CP) and metabolisable energy (ME) was calculated from the analysed results. Nutritional gap in terms of the above was arrived by finding the difference between the nutritional availability and requirement (Ranjan 1998). The data were statistically analyzed using mean and standard error as per standard procedure (Snecdecor and Cochran 1994) to draw meaningful conclusions.

RESULTS AND DISCUSSION

Socio-economic status and milk production: Majority of the farmers' families in Uttarakhand are nuclear with a family size of 6.1 in Jakhanidhar and 5.2 in Gangolihat blocks. Families in these regions keep buffalo to meet their daily needs. Women keep themselves meaningfully engaged in livestock rearing as men folk migrate to the plains for

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Table 1. Socio-economic status and seasonal milk production in surveyed areas

Parameter	Block Jakhnidhar (District Tehri)	Block Gangolihat (District Pithoragarh)
Family size (numbers)	6.1±0.67	5.2±0.44
Landholding(ha/family)	0.58±0.79	0.168±0.02
Livestock holding (number/family)	4.7±0.63	5.6±0.63
Lactation length (months)	11.2±1.03	12.2±0.86
Average body weight (kg)	306.33	310.74
Average milk production (l/day/animal/ summer)	3.05±0.28	3.0±0.33
Milk production potential under optimum feeding*	3.81	3.75
Average milk production (l/day/animal/rainy season)	1.8±0.28	2.353.±0.15
Milk production potential under optimum feeding*	2.25	2.35
Average milk production (l/day/animal/winter)	1.7±0.08	1.9±0.26
Milk production potential under optimum feeding*	2.13	2.38

* Milk production potential is calculated as 25% more than the current level of production as was observed in animals of the same breed in the same environment but under optimum feeding situation.

employment. Tehri Garhwal farmers have more land (0.58ha/family) but less livestock (4.7 /family) in comparison to Pithoragarh farmers (Table 1) whose land holding is less (0.16 ha/family) but livestock number is more (5.6 /family). The human and livestock numbers per family are almost same in both the districts. In this study sites majority of the farmers keep non-descript breeds of buffalo. Average body weight of the dairy buffaloes was 306 kilograms in Tehri Garhwal and 310 kg in Pithoragarh (Table 1). In blocks Jakhanidhar and Gangolihaat, average milk production per day per animal was 3.0 litres in summer, 1.8 and 2.35 litres in rainy, 1.7 and 1.9 litres in winters respectively. Generally buffalo give more milk during winters, but in this study the less milk production in winters was observed because of late lactation period of the selected animals, perhaps also because of cold stress in winter.

Buffalo milk market is locally developed in both the study sites as there is high demand in the villages as well as in the nearby small towns like Pokhal Molno in district Tehri Garhwal and Gangolihaat in Pithoragarh. Generally, farmers in both the areas sell milk to the local market, neighbours milk union and community owned milk federations. At the time of survey the community owned federations paid farmers @ Rs 17 /litre in Jakahanidhar block and Rs 22/litre in block Gangolihaat. Quality was judged based on 28–30 lactometer reading and payment was made accordingly.

Existing feeding practices in block Jakhanidhar (Tehri Garhwal): The livestock owners used to feed a wide range of feeds and fodders like: wheat straw (*Triticum aestivum*), paddy straw (*Oryza sativa*), barnyard millet straw (*Echinochloa frumentacea*), dry grass (*Heteropogon contortus*), and green grass (*Heteropogon contortus*). Tree leaves used as fodder by farmers were: timila (*Ficus roxburghii*), khadik (*Celtis* spp), denkan (*Melia* spp) and bhimal (*Grewia* spp).The tree leaves and grasses (collected from own farms and forests) form the major source of roughage in the hills. Crop residues and dry grasses are stored and fed to animals during lean period stretching from November to May (acute shortage is from January-April). Yadava (2003) estimated that in the Central Himalayas nearly 66% of the fodder requirement is met by pasture and tree leaves. Generally, the farmers do not cultivate fodder crops in the arable land. Home based concentrate mixture (consisting of cooked wheat and rice) and kitchen waste were used for feeding animals which mainly consisted of wheat (*Triticum aestivum*), mandua /finger millet (*Eleusine coracana*) and rice flour (*Oryza sativa*). In Pithoragarh other than Baanj (*Quercus leucotrichophora*) tree's leaves, which are available in plenty in the nearby forest, were mostly fed during summer and in some cases during winter when bhimal (*Grewia* spp) leaves were not available. Wheat straw was the common dry fodder across the three seasons along with mixed dry grass locally called as *Gajjyo.* Farmers preferred to feed bhimal (*Grewia* spp) leaves in the winter season and green grass during rainy period. Balanced feeds and mineral mixture supplements were not at all considered in Tehri due to lack of knowledge and/ or low purchasing power. But it was observed that some the farmers in Gangolihaat offered commercial feed pellets from brands to their dairy buffaloes.

It was interesting to note that the some of the buffalo rearers of Pithoragarh held an interesting opinion about feeding of baanj (*Quercus leucotrichophora*) leaves, they thought it made the milk cream and curd thick while others from the same district felt that feeding baanj (*Quercus leucotrichophora*) leaves are detrimental to pregnant buffaloes.

Chemical composition and nutritional evaluation: The chemical composition of feeds and fodders (% DM basis) available in different seasons in the surveyed districts is presented in Table 2. It is worth mentioning that the tree leaves fed to animals by the farmers are found to contain a higher level of crude protein (Denkan-16.65%, Timila-12.34%, Khadik-12%, Bhimal-9.23%). This finding is in close agreement with those reported by Shukla *et al.* (2007).

It can be seen that the crude protein content in baanj tree leaves (18.23%) was relatively higher. It was noticed that while crude protein value of bhimal tree leaves in Pithoragarh was 7.1%, the value for the same was higher in Tehri (9.23%). This variation, as reported by Pal *et al.* (1979), was because of factors like season, soil, environment and stage of harvest.

Dry matter intake and nutritional status and gap: The

Table 2. Chemical composition of feeds /fodder in surveyed areas

Feeds/fodder	Average Range						
	DM (%)	EE(%)	CP (%)	CF (%)	AIA (%)	TDN(kg/ kg DM)	ME(MJ/ kg DM)
Home based concentrate	88.9	3.4	11	12.75	0.4	0.91	13.77
Wheat straw (*Triticum aestivum*)	90.1	1.2	2.2	34.45	3.35	0.44	6.66
Paddy straw (*Oryza sativa*)	92.15	0.7	1.85	38.22	13.34	0.42	6.35
Jhangora straw, Barnyard Millet, (*Echinochloa spp*)#	92.27	0.7	4.1	35.44	2.16	0.47	7.11
Timila leaves (*Ficus roxburghii*)#	64.46	8.5	12.34	29.8	0.8	0.6	9.08
Khadik leaves (*Celtis spp*)#	90.1	2	12	28.35	3.53	0.54	8.17
Denkan leaves (*Melia spp*)#	66.04	5.1	16.65	28.75	0.001	0.75	11.35
Dry grass, Kumaria (*Heteropogon contortus*)	87.23	1.4	4.64	28.76	2.87	0.44	6.66
Green grass/Kumaria (*Heteropogon contortus*)	28.06	1.8	7.64	10.76	2.49	0.5	7.57
Bhimal (*Grewia* spp.)	50.7	1.6	8.1	27.7	0.35	0.8	12.33
Gajjyo/Mixed dry grass*	88.73	0.8	5.91	28.35	3.34	0.55	8.32
Baanj (*Quercus leucotrichophora*)*	57.18	12	18.23	27.54	0.003	0.55	8.32
Commercial feed pellet*	89.21	1.8	18.25	12.66	3.83	0.89	13.47
Wheat bran*	88.44	2.9	13.84	11.88	0.11	0.88	13.31
Green grass, Kumaria (*Heteropogon contortus*)	23.57	2	4.33	27.33	1.7	0.56	8.47

*available in Pithoragarh, # availability in Tehri Garhwal. DM, dry matter; EE ,ether extract; CP, crude protein; CF, crude fibre; AIA, acid insoluble ash; TDN, total digestible nutrients, ME, metabolisable energy. Values are on DM basis except for dry matter.

Table 3. DMI, nutritional status and gap in the surveyed area

Attributes	Tehri Garhwal	Pithoragarh
DMI (kg)	5.6	5.5
DMI/100 kg BW	1.8	1.7
DM Requirement (kg)	7.6	7.7
Deficit (%)	25	27
CP intake (g)	294.2	282.2
CP requirement (g)	367.5	386.7
Deficit (%)	19	27
ME intake (MCal)	42.4	41
ME requirement (MCal)	49.6	51
Deficit (%)	17.3	18.6

nutritional requirement (Ranjan 1998), present intake and gap of dry matter, CP and ME in both the sites are presented in Table 3. As indicated the dairy buffaloes in both the sites exhibited negative balance for DM, CP and ME. The results showed that both in Tehri as well as in Pithoragarh, the animals were underfed in terms of quantity (DM) and quality (CP and ME). In Tehri, the shortage of dry matter was in the range of 25%, whereas protein shortage was 19% and energy deficit 17.3%. In Pithoragarh district the shortages were 27% (DM), 27% (CP) and 18.6% (ME).

In both the districts major quantity of dry matter came from straw and dry grasses while remaining came from tree leaves, green grass and home based concentrates. The intake dependent mainly on local availability of different feedstuffs. In Tehri Garhwal, diet composition in summer consisted of straws (71%), tree leaves (22.71%) and 5.51% as home based concentrate, in rainy season it had wheat straw (52.82%), green grass (46.86%) and home based concentrate (0.32%) and in winters dry grass (81.77%), tree leaves (14.15%) and home based concentrate (4.07%). In district Pithoragarh summer diet composed of straws (65.79%), dry grass (11.50%), tree leaves (18.53%), home based concentrate (3.08%), feed pellet (0.94%) and wheat bran (0.16%). In rainy season green grass constituted more than half (58.06%) in diet than straw (41.14%) and home based concentrate (0.80%). In case of winters diet composition had mainly straw (70%) and dry grass (2%), tree leaves (26%), home based concentrate (1%) and commercial pellets (1%). Farmers generally did not attempt to fill the gap by feeding supplementary feeds, reported to be due to low production capacity of the animals, low purchasing power and lack of knowledge. In both the districts, the options available to fill the major gaps were: (i) improve the quality of straws (ii) cultivate legume fodder trees in private /public wastelands to lop and feed as fodder, (iii) supplement present feeds with any of the locally available (de-oiled) cakes with higher protein content. In terms of quantity, about 2 kg of (enriched) straw (or 10 kg grass /weeds /tree leaves) and half kg of cake would be sufficient to fill the gap and produce 25% more milk (gap is calculated based on potential production under better feeding).

It can be concluded that a considerable nutritional deficit

is found in terms of nutrient availability through different feed ingredients which are not enough to fulfil the requirements of the animals as per standard. In the present scenario of feeding practices the use of good quality feeds and adoption of supplemental feeding in respect to energy, protein and crude protein would be beneficial to improve nutritional status of the animals. The approach of 'utilize better' (improving the quality of present feed stuffs), 'produce more' (increasing biomass production) and 'import' (bringing nutrient supplements) could be resorted to fill the nutritional gap and optimize milk production in both the districts. Besides, farmers' awareness is also required to be raised on balance feeding practices using locally available feed resources.

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