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Nutritional Status of Dairy Cattle in the North-Western Himalayan Region of the Kashmir Valley

Research Article

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ABSTRACT

A field study was conducted in nine villages, three each from Kupwara, Handwara and Karnah Tehsils of Kupwara district, to find out the nutritional value of feeds and fodders, existing feeding practices and nutritional status of dairy cattle. Data was collected from the fifteen farm families from each of the nine were randomly selected through a common questionnaire. All the farmers were found to add the basal diet(paddy straw, rice bran and wheat bran) with salt (NaCl)) and none of the farmers used a mineral supplement with the diet. The mean values of daily dry matter intake (DMI) for lactating cows was 19.61 and 43.93% above the estimated feed intake according to the feeding standards (FS) for Kupwara and Handwara tehsils The DMI of dry cows was 41.40 and 37.21% above the DMI stated in the FS requirements. According to the live body weight of heifers, the daily DMI was observed to be 22.90, 46.78 and 6.80% above DMI requirements in the Kupwara, Handwara and Karnah tehsils, respectively. The daily digestible crude protein (DCP) intake in case of lactating cows was 12.65 and 38.10% above their requirement for Kupwara and Handwara tehsils. The dry cows has a DCP intake that was 19.81 and 19.94% above FS requirements in Kupwara and Handwara tehsils. Heifer daily DCP intake was 10.24 and 80.16% below FS requirements in Kupwara and Karnah tehsils, respectively The daily intake of DCP for calves was 29.5, 29.6 and 78.4 % below FS requirements in the respective tehsils. The daily intake of total digestible nutrients (TDN) were above FS requirements by 36.70, 55.9 and 7.6% for lactating cows; 51.10, 48.49 and 11.65% for dry cows; 45.85, 60.0 and 18.54% for heifers; 2.70, 14.7 and 11.7% for calves in the respective tehsils. The milk urea nitrogen concentration of the lactating cows were 18.55±0.74, 21.29±1.31 and 16.87±1.41 mg/dl for the respective tehsils. It was concluded that most of the farmers rear non-descript indigenous cattle of low body weight potentially to a general trend of under feeding protein in calves and sometimes growing heifers, which limits milk production. The genetic potential of the dairy cattle, nutrient imbalance in the diet and farmer awareness of balanced diets are also a potential problem.

KEY WORDS dairy cattle, Himalayan region, Kashmir Valley, nutritional value.

INTRODUCTION

India has emerged as the largest milk producer in the world, but the individual productivity of dairy animals remains relatively low.

This low milk production by Indian cattle and buffaloes has been attributed to several factors of which inadequate nutrition is the single largest factor responsible for low milk production levels in established dairy breeds. Several reports have indicated that there is a deficiency of green and dry fodder, and commercial compound in the country, which provides inadequate feed for expression of the genetic potential of dairy cattle (Ranjhan, 1994 and Kundu *et al.* 2005).

The state of Jammu and Kashmir has three distinct climatic zones viz., subtropical, temperate and cold arid and the livestock rearing practices in these zones exhibit wide diversity. Jammu and Kashmir have potential grazing resources in the form of forests, green meadows and pastures, but the nutritional status of the majority of animals is far from satisfactory and the health and productivity of the animals declines during the winter, when green forages perish between November to December. There is tremendous pressure from livestock on available feed and fodder available, as the land area available for fodder production is limited. The production of food from livestock production and livestock feed resources in the hills of the Kashmir valley remains a continuing concern of local people, which depend primarily on the sustainability of their livestock. Overgrazing, degradation of pasture land and the increasing cost of animal feed ingredients are some of the other factors that directly influence livestock productivity. The feeding systems of un-organised dairy farming in the valley mainly comprises of crop residues, crop by-products and other locally available roughages. Such feeding practices often do not meet the nutrient requirements of the animals and can affect productive and reproductive performance of the dairy cattle (Anon, 2005). The available feeds and fodders in the Kashmir valley mostly consist of crop residues and byproducts, which are not only insufficient in quantity but also have poor digestibility and nutritional values that result in low livestock productivity.

This low productivity due to poor nutrition is exacerbated by long calving intervals and increased age of puberty (Singh and Shahoo, 2003). Furthermore, another characteristic of temperate regions is that the feeds and fodder availability is seasonal in the valley and results in an acute shortage in the production of green fodder during peak winter.

MATERIALS AND METHODS

The present study was conducted in the District Kupwara of Kashmir valley during the winter months from November to March. The district is the northern most district of the Kashmir valley situated at an altitude of 5300 feet above sea level. This district has three tehsils namely Kupwara, Handwara and Karnah, where Kupwara is the backward frontier district of Kashmir Valley. The district portrays the scenic beauty of the grazing grounds of cattle and sheep, while climatologically the winters are cold (-2 to 10 ˚C) with heavy snow fall and the summers are pleasant (33 ˚C).

Although the district is considered deficient in natural irrigation, about 90% of the population depends, in one way or another, on agriculture for their livelihood. The rearing of livestock is one of the main sources of income.

For this purpose fifteen farm families from each of the nine villages 3 each from Kupwara, Handwara and Karnah tehsils of the district and 135 animals from each category namely dairy calves, heifers, lactating and pregnant cows were randomly selected to find out the macronutrient [dry matter intake (DMI), digestible crude protein (DCP) intake and total digestible nutrients (TDN)] status of feeds and fodders, existing feeding practices and nutritional status of dairy cattle. The fifteen farmers from each village were randomly selected for the study and data was collected from the farmers through the application of a common interview survey schedule.

A collection of samples of livestock feeds and fodders that were being offered to animals were collected from each village, followed by which they were oven dried at 80 ±5 ˚C for 24 hours until a constant weight was obtained and were subsequently ground (1 mm) and analyzed by proximate analysis principles according to the methods described by AOAC (1995), while the fiber fraction was assessed according to Van Soest *et al.* (1991). The milk fat (%) composition was analyzed by milk auto analyzer and the Microkjeldhal's method (AOAC, 1995) was followed for estimation of total milk nitrogen (%). The digestible crude protein value of the available feeds and fodders was calculated using digestibility coefficient value given by Ranjhan (2001), while the TDN was estimated using the following equations reported by Martin (1985) and Chandler (1990):

For straw: TDN (%)= [96.4-1.15×ADF (%)]
For native grass: TDN (%)= [(105-0.68×NDF (%)]
For commercial compound (or concentrated feeds): TDN (%)= [81.4-0.48×NDF (%)]

The body weight of the cattle was calculated using Shaffer's formula (Sastry *et al.* 1982) and the factor 0.4536 was used to convert these body weights in pound (lb) into kilogram (kg). The amount of daily DCP and TDN consumed by different categories of dairy cattle were calculated from feed intake on the basis of average nutritive values of feeds and fodders (Ranjhan, 2001). The individual animal feed intake, approximate body weight (kg) based on body measurements and milk yield was recorded during the study.

The estimated supply of nutrients (DM, DCP and TDN) to different categories of animals was compared with the nutrient requirement given in feeding standards (FS) (Ranjhan, 1998) to determine the nutritional status of different categories of dairy cattle.

The data obtained in this experiment were analyzed using conventional statistical procedure as suggested by Snedecor and Cochran (1994) and were checked for normal distribution and found to be normally distributed and analyzed by

SPSS using parametric analysis one way analysis of variance (ANOVA) considering DMI, DCP, TND in the model as fixed effects and individual animal as a random effect. The data was presented as means with individual standard errors and significance of mean differences was tested by Duncan's new multiple range test.

RESULTS AND DISCUSSION

In all the three tehsils the most commonly available feed resources for feeding to dairy cattle included; wheat bran, rice bran, pelleted feed, mustard, linseed cake, rice paddy straw, maize stover, oat hay and grass hay, whilst in the tehsil Handwara and Karnah wheat straw was also offered to livestock. It was found that rice paddy straw, rice bran and wheat bran were the most commonly used feed ingredients offered to the animals, mainly due to rice and wheat being the main cereal crops grown in tehsil Handwara and Karnah. Therefore, it is the local availability of straw and bran that influenced their use as animal feed, which was in agreement with Singh *et al.* (2008) who reported that rice paddy straw constituted the basal dry roughage offered to the animals. While, Bakshi *et al.* (2009) observed that bajra and sorghum were the predominant fodders offered to livestock.

The average body weight of lactating cows and the heifers were 205.78±6.81, 196.83±4.90 and 176.58±2.75 kg; 75.87±2.25, 71.01±1.40 and 68.71±1.35 kg for Kupwara, Handwara and Karnah tehsils respectively and was significantly ($P<0.05$) lower for Karnah tehsil than Kupwara and Handwara tehsils (Table 1).

The average body weight of the dry cows was 165.0.57±0.10, 175.15±3.75 and 161.98±3.35 kg for the respective tehsils. The body weight was significantly ($P<0.05$) higher for Handwara tehsil than Kupwara and Karnah tehsil. Likewise, the average body weight of the calves was 40.91±2.07, 37.76±1.08 and 37.87±1.23, respectively (Table 1). The body weight was non-significantly higher for Kupwara followed by Karnah and Handwara tehsils.

Contrary, to the present observation Tiwary *et al.* (2007) reported that the body weight of the adult cattle and buffaloes ranged between 300 to 400 kg in the surveyed area. The lower body weight of the animals in the current study was obliviously due to more number of indigenous cattle.

Further imbalanced feeding also restricts growth thereby affecting overall body weight of the animals.

All the farmers surveyed were found to fortify the basal diet of the animals with common salt (NaCl) and allowed to drink fresh and clean drinking water free of choice.

In tehsil Handwara and Karnah common salt was mixed with concentrate mixture at a rate of 50 g/d and offered to the animals, while in tehsil Kupwara common salt was mixed with drinking water. Similar observations to the present study were reported by Meena *et al.* (2008) and Tiwary *et al.* (2007) who found that it was a common practice of feeding common salt to different categories of animals.

In this study, none of the farmers were found to supplement cattle with mineral supplements in the diet and the survey showed that there was lack of knowledge among farmers with regard to importance of minerals in the livestock production.

These findings were similar to those of Mudgal *et al.* (2003) who reported that none of the farmers were found to be using mineral supplements in the ration of the animals, while Bakshi *et al.* (2009) found that 2.5% of the farmers in Ferozpur and 9.52% in Moga district were feeding mineral supplements to their animals.

Moreover, Tiwary *et al.* (2007) reported that 50% of the farmers supplemented the ration of the animals with a mineral mixture. In this study, feed additives were also not used by the farmers.

The farmers were found to prepare a homemade concentrated feed mixture by blending wheat bran and rice bran together. In tehsil Kupwara wheat bran and rice bran were mixed in the ratio of 1:1, while in tehsil Handwara and Karnah wheat bran and rice bran were mixed in the ratio of 1:2 and 1:0.25 respectively.

Meena *et al.* (2008) reported that farmers prepared concentrate mixture by mixing cereal flours and oil cakes in 1:1 ratio.

However, Mudgal *et al.* (2003) observed that concentrate mixture was prepared by mixing brans with pulse chunnies in different combinations with cotton seed cake. Similarly, Tiwary *et al.* (2007) reported that farmers prepared concentrate mixture by blending cotton seed cake, wheat bran and crushed maize in the ratio of 1:3:3. In tehsil Karnah some farmers offered wheat straw after soaking in the water, which was similar to observations in an earlier study by Mudgal *et al.* (2003).

Table 1 Body weight of different categories of dairy cattle in different tehsils

Type of animal	Tehsils			Overall
	Kupwara	Handwara	Karnah	
Lactating cow	205.78±2.25^{b}	196.83±4.90^{b}	176.58±2.75^{a}	193.06±3.3
Dry cow	165.57±0.10^{a}	175.15±3.75^{b}	161.98±3.35^{a}	167.56±2.4
Heifer	75.87±2.25^{b}	71.01±1.40^{a}	68.71±1.35^{a}	71.86±1.6
Calf	40.91±2.07^{a}	37.76±1.08^{a}	37.87±1.23^{a}	38.84±1.4

The means within the same row with at least one common letter, do not have significant difference ($P>0.05$).

This may be due to the fact that soaking of dry roughages prior to feeding was practiced in order to improve the DM intake. The cattle offered pelleted feeds that were purchased from the market and mostly provided to the lactating dairy animals. Rice bran was used by all the farmers for feeding animals in Kupwara and Handwara tehsils while in Karnah tehsil only 25% of the farmers used rice bran.

The chemical composition of various feed resources for the overall district (Table 2) shows that the DM content of feed resources ranged from 85.0±0.6 to 90.6±0.3%, with highest DM recorded for concentrates and lowest for dry roughages. The organic matter (OM) ranged from 84.8±0.7 to 93.7±0.6%, the highest being in Mustard Oil Cake (MOC) and lowest in maize straw. The crude protein (CP) content was highest in MOC (35.7±1.5%) and lowest in wheat straw (3.3±0.1%). The fat or ether extracts (EE) content ranged between 1.7±0.2 to 10.2±2.3 % being highest in MOC and lowest in maize and paddy straw. The crude fiber (CF) content was highest in maize straw (39.0±1.3%) and lowest in MOC (7.70±1.3%).

The nitrogen free extract (NFE) content of feed resources ranged from 39.8±1.2 to 64.8±0.8%, indicating highest for wheat bran and lowest for maize straw. The ADF and NDF content ranged from 10.6±1.2 to 53.0±1% and 24.5±0.5 to 78.0±0.5%.

The ADF content was found to be lowest in wheat bran and highest in paddy straw and NDF content was found lowest in MOC and highest in maize straw. The total ash content was highest in maize straw (15.2±0.6%) and lowest in MOC (6.3±0.5%). These results of proximate analysis indicated that there was a typical chemical composition of various feeding resources and that these were similar to those reported by Ganai *et al.* (2006) and Misra *et al.* (2009).

The daily intake of DM for lactating cows was 6.89±0.16, 7.60±0.15 and 5.02±0.67 kg/d for the respective tehsils, which was significantly (P≤0.05) higher for Handwara tehsil followed by Kupwara and Karnah tehsils. The estimated supply of DM compared with the nutrient requirements stated in feeding standards (Ranjhan, 1998) revealed that the lactating cows in this survey were offered 19.61, 43.93% excess DM per day in Kupwara and Handwara tehsil, respectively, while in Karnah tehsil daily DMI was deficit by 4.74%.

The daily intake of DM for dry cows was 6.25±0.29, 6.60±0.32 and 3.82±0.17 kg/d for the respective tehsils. The DMI was significantly (P<0.05) higher for Handwara and Kupwara tehsils than Karnah tehsil. The daily DMI was 41.40 and 37.21% excess that of the nutrient requirement according to the feeding standards (Ranjhan, 1998) while in the Karnah Tehsil the daily DMI for dry cows represented a deficit of 6.8%.

The daily DMI of above twelve month old heifers was 2.95±0.15, 3.42±0.17 and 2.35±0.18 kg in the respective tehsils, which was observed to be 34.09, 46.60 and 6.8% in excess of requirements for heifers in Kupwara, Handwara and Karnah tehsils, respectively, according to the body weight of the heifers.

In case of calves, in all the tehsils the calves from birth to three months of age were allowed to take dam's milk free of choice and afterwards they were restricted to suck their mother and allowed to graze with supplementation of some concentrates.

The daily DMI of calves, between three and twelve months of age, was 1.45±0.08, 1.34±0.04 and 1.32±0.03 kg for the respective tehsils. The DMI was not significantly (P>0.05) different for calves in Kupwara tehsil followed by Handwara and Karnah tehsils and the ration for calves was found to be in excessive in DM by 30.6, 31.37 and 28.15% in the respective tehsils.

In overall district, the daily intake of DM of lactating cows, dry cows, heifers and calves were 6.55±0.13, 5.59±0.29, 2.91±0.13 and 1.32±0.03 kg and was 20.84, 25.90, 25.97 and 30.4% respectively above the requirements given in the feeding standards (Ranjhan, 1998), which was similar to Fadel Elseed *et al.* (2008), Bishoni and Singh (2009) who reported that the daily intake of DM was higher than the feed intake potential of the animals. These findings were contrary to Tiwary *et al.* (2007) who reported that different categories of dairy cattle were offered a diet 13.8% below the DM intake potential of the animals, which was similarly to Mudgal *et al.* (2003) who observed that daily intake of DM was lower than the feed intake potential stated in the standard requirements. The higher intake of DM was due to higher intake of paddy straw because its local availability favors its use as animal feed particularly during winter months.

The daily average DCP intake through different feed resources for lactating cows were 390±13.66, 469.01±13.44 and 295.71±7.43 g for Kupwara, Handwara and Karnah tehsils, respectively.

The daily DCP intake was significantly (P<0.05) higher for Handwara tehsil followed by Kupwara and Karnah tehsils. The DCP intake was 12.65 and 38.1% above their requirement for Kupwara and Handwara tehsils while for Karnah tehsil DCP intake was 5.22% below DCP intake requirements. The daily intake of DCP for dry cows was 325.62±11.80, 331.74±13.94 and 267.05±2.92 g for the respective tehsils. The DCP intake was significantly (P<0.05) lower for Karnah tehsil than Kupwara and Handwara tehsils. The DCP intake of dry cows was 19.81 and 19.94% higher in Kupwara and Handwara tehsils, while for Karnah tehsil daily DCP intake was 1.0% below FS requirements.

Table 2 Chemical composition (%) of feeds and fodders of the Kupwara district

Feed	Chemical composition (%)[1]								
	DM	OM	CP	EE	CF	NFE	ADF	NDF	Total ash
Wheat bran	90.6 ±0.3	92.7 ±1.1	13.1 ±0.2	3.1 ±0.3	11.5 ±1.1	64.8 ±0.8	10.6 ±1.2	41.3 ±1.4	7.2 ±0.6
Rice bran	88.6 ±0.6	86.0 ±1.2	11.2 ±0.1	2.1 ±0.3	20.5 ±1.3	52.3 ±0.6	36.9 ±5.0	62.6 ±1.2	13.9 ±0.9
MOC in full	90.5 ±0.5	93.7 ±0.6	35.7 ±1.5	10.2 ±2.3	7.7 ±1.3	40.1 ±0.4	13.5 ±1.5	24.5 ±0.5	6.3 ±0.5
Linseed	89.0 ±0.5	91.7 ±0.4	31.3 ±0.4	8.8 ±1.2	9.5 ±0.9	42.03 ±0.9	12.6 ±0.3	26.3 ±0.3	8.3 ±0.3
Pelleted feed	89 ±0.5	86.3 ±0.4	11.6 ±0.2	2.5 ±0.5	19.9 ±1.4	52.9 ±0.8	27.3 ±1.8	41.6 ±0.8	13.6 ±0.3
Local grass	85.6 ±0.6	90.5 ±1.1	8.6 ±0.1	2.5 ±0.2	28.8 ±1.7	50.6 ±1.1	38.0 ±2.6	58.6 ±1.7	9.4 ±0.5
Oat hay	85.6 ±0.3	91.4 ±0.4	10.2 ±0.3	2.3 ±0.1	26.5 ±0.7	52.4 ±0.9	44.0 ±5.0	53.0 ±5.0	8.5 ±0.4
Paddy straw	85.0 ±0.5	86.2 ±0.2	3.53 ±0.1	1.8 ±0.3	38.8 ±1.8	42.0 ±0.5	53.0 ±1.1	75.0 ±1.5	13.7 ±0.6
Maize stover	85.6 ±0.3	84.8 ±0.7	4.4 ±0.1	1.7 ±0.3	39.0 ±1.3	39.8 ±1.2	49.3 ±0.8	78.0 ±0.5	15.2 ±0.6
Wheat straw	85.5 ±0.5	88.0 ±0.5	3.3 ±0.1	1.7 ±0.2	36.4 ±0.8	46.5 ±0.3	37.0 ±1.0	73.0 ±1.0	12.0 ±0.5

[1] DM: dry matter; OM: organic matter; CP: crude protein; EE: ether extract; CF: crude fibre; NFE: nitrogen free extract; ADF: acid detergent dibre and NDF: neutral detergent fibre.

Table 3 Dry matter (DM), digestible crude protein (DCP) and total digestible nutrients (TDN) intake and their recommended levels by feeding standards for lactating cows in the Kupwara (Ku), Handwara (H) and Karnah (Ka) Tehsils of India

Parameters[4]	DM intake (kg/d)[1]				DCP intake (g/d)[2]				TDN intake (kg/d)[3]			
	Ku	H	Ka	Overall	Ku	H	Ka	Overall	Ku	H	Ka	Overall
Intake	6.89± 0.16^{b}	7.60± 0.15^{c}	5.02± 0.67^{a}	6.55± 0.13	390.8± 13.6^{b}	469.0± 13.4^{c}	295.7± 7.4^{a}	386.2± 9.5	4.32± 0.11^{a}	4.85± 0.12^{b}	3.10± 0.10^{a}	4.11± 0.09
Requirements[5]	5.76± 09.20^{b}	5.28± 0.98^{a}	5.27± 0.16^{a}	5.42± 0.10	346.9± 10.1^{b}	339.6± 9.2^{b}	312.0± 8.0^{a}	333.8± 5.5	3.16± 0.08^{b}	3.11± 0.07^{b}	2.88± 0.06^{a}	3.06± 0.04
Difference	1.13	2.32	-0.25	1.13	43.9	129.4	-16.3	52.4	1.16	1.74	0.22	1.05
Surplus / deficit (%)	19.61	43.93	-4.74	20.84	12.65	38.10	-5.22	15.6	36.7	55.9	7.6	34.31

[1] DM intake= voluntary intake × DM (%) content of the feed / fodders.
[2] % DCP= DC/100 × CP %; Where: DC= digestibility coefficient as per Ranjhan (2001) and CP= crude protein content of feed / fodders.
[3] % of TDN, as per Martin (1985) and Chandler (1990) calculated as follows:
TDN (%) in straw= 96.4 – 1.15 × ADF (%)
TDN (%) in native grass= 105 - 0.68 × NDF (%)
TDN (%) in concentrates= 81.4 - 0.48 × NDF (%)
[4] The means within the same row with at least one common letter, do not have significant difference (P>0.05).
[5] Nutrient requirements as per Feeding Standard (FS) given by Ranjhan, (1998).

Table 4 Dry matter (DM), digestible crude protein (DCP) and total digestible nutrients (TDN) intake and their recommended levels by feeding standards for dry cows in the Kupwara (Ku), Handwara (H) and Karnah (Ka) Tehsils of India

Parameters[4]	DM intake (kg/d)[1]				DCP intake (g/d)[2]				TDN intake (kg/d)[3]			
	Ku	H	Ka	Overall	Ku	H	Ka	Overall	Ku	H	Ka	Overall
Intake	6.25± 0.29^{b}	6.60± 0.32^{b}	3.82± 0.17^{a}	5.59± 0.29	325.6± 11.8^{b}	331.6± 31.9^{b}	267.0± 2.9^{a}	308.9± 12.2	3.43± 0.14^{b}	3.46± 0.18^{b}	2.49 ±0.12^{a}	3.14± 0.12
Requirements[5]	4.42± 0.22^{b}	4.81± 0.27^{c}	4.10± 0.23^{a}	4.44± 0.12	271.6± 2.8^{a}	276.6± 2.1a	269.7± 2.0^{a}	272.3± 1.5	2.27± 0.32^{a}	2.33± 0.25^{a}	2.23 ±0.24^{a}	2.27± 0.17
Difference	1.83	1.79	-0.28	1.15	54.0	55.0	-2.7	36.6	1.16	1.13	0.26	0 .87
Surplus / deficit (%)	41.40	37.21	-6.80	25.90	19.81	19.94	-1.0	13.44	51.10	48.49	11.65	38.32

[1] DM intake= voluntary intake × DM (%) content of the feed / fodders.
[2] % DCP= DC/100 × CP %; Where: DC= digestibility coefficient as per Ranjhan (2001) and CP= crude protein content of feed / fodders.
[3] % of TDN, as per Martin (1985) and Chandler (1990) calculated as follows:
TDN (%) in straw= 96.4 – 1.15 × ADF (%)
TDN (%) in native grass= 105 - 0.68 × NDF (%)
TDN (%) in concentrates= 81.4 - 0.48 × NDF (%)
[4] The means within the same row with at least one common letter, do not have significant difference (P>0.05).
[5] Nutrient requirements as per Feeding Standard (FS) given by Ranjhan, (1998).

In case of growing heifers daily DCP intake was significantly (P<0.05) higher for Handwara tehsil (308.75±10.39 g) followed by Kupwara (236.56±10.72 g) and Karnah tehsil (51.87±6.87 g) respectively and daily DCP intake was 10.24 and 80.16% below FS requirements in Kupwara and Karnah tehsils, respectively, while in Handwara tehsil DCP intake was 17.6% higher than their requirement according to the feeding standards (Ranjhan, 1998). The daily intake of DCP for calves in Kupwara (81.63±6.35 g) and Handwara (76.76±2.76 g) tehsils was significantly (P<0.05) higher than Karnah tehsil (23.33±1.55 g) and was 29.5, 29.6 and 78.4% below the FS requirements for the respective tehsils. In the whole district the daily DCP intake for lactating cows, dry cows, heifers and calves were 386.29±9.35, 308.93±12.23, 199.06±23.5 and 60.54±3.90 g, respectively, and DCP intake were 15.6 and 13.44% higher than the FS requirements for lactating cows and dry cows, respectively, while for heifers and calves daily DCP

Table 5 Dry matter (DM), digestible crude protein (DCP) and total digestible nutrients (TDN) intake and their recommended levels by feeding standardsfor growing heifers in the Kupwara (Ku), Handwara (H) and Karnah (Ka) Tehsils of India

Parameters[4]	DM intake (kg/d)[1]				DCP intake (g/d)[2]				TDN intake (kg/d)[3]			
	Ku	H	Ka	Overall	Ku	H	Ka	Overall	Ku	H	Ka	Overall
Intake	2.95± 0.15^{b}	3.42± 0.17^{b}	2.35± 0.18^{a}	2.91± 0.13	236.5± 10.7^{b}	308.7± 10.3^{c}	51.8± 6.8^{a}	199.0± 23.65	2.29± 0.15^{b}	2.48± 0.13^{b}	1.79± 0.10^{a}	2.19± 0.09
Requirements[5]	2.40± 0.08^{b}	2.33± 0.05^{b}	2.20± 0.14^{a}	2.31± 0.05	263.5± 2.3^{a}	262.5± 2.3^{a}	261.2± 2.7^{a}	262.4± 1.3	1.57± 0.07^{b}	1.55± 0.08^{b}	1.51± 0.02^{a}	1.54± 0.03
Difference	0.55	1.09	0.15	0.6	-27.0	46.2	-209.4	-63.4	0.72	0.93	0.28	0.65
Surplus / deficit (%)	22.9	46.78	6.8	25.9	-10.24	17.6	-80.16	-24.16	45.85	60.0	18.54	42.20

[1] DM intake= voluntary intake × DM (%) content of the feed / fodders.
[2] % DCP= DC/100 × CP %; Where: DC= digestibility coefficient as per Ranjhan (2001) and CP= crude protein content of feed / fodders.
[3] % of TDN, as per Martin (1985) and Chandler (1990) calculated as follows:
TDN (%) in straw= 96.4 – 1.15 × ADF (%)
TDN (%) in native grass= 105 - 0.68 × NDF (%)
TDN (%) in concentrates= 81.4 - 0.48 × NDF (%)
[4] The means within the same row with at least one common letter, do not have significant difference (P>0.05).
[5] Nutrient requirements as per Feeding Standard (FS) given by Ranjhan, (1998).

Table 6 Dry matter (DM), digestible crude protein (DCP) and total digestible nutrients (TDN) intake and their recommended levels by feeding standardsfor calves in the Kupwara (Ku), Handwara (H) and Karnah (Ka) Tehsils of India

Parameters[4]	DM intake (kg/d)[1]				DCP intake (g/d)[2]				TDN intake (kg/d)[3]			
	Ku	H	Ka	Overall	Ku	H	Ka	Overall	Ku	H	Ka	Overall
Intake	1.45± 0.08^{a}	1.34± 0.04^{a}	1.32± 0.03^{a}	1.37± 0.05	81.63± 6.3^{b}	76.76± 2.7^{b}	23.33± 1.5^{a}	60.54± 3.9	1.14± 0.05^{b}	1.09± 0.05^{a}	0.95± 0.04^{b}	1.05± 0.04
Requirements[5]	1.11± 0.05^{b}	1.03± 0.03^{b}	1.02± 0.02^{a}	1.05± 0.02	115.8± 5.3^{a}	109.1± 5.2^{a}	108.1± 5.0^{a}	111.0± 3.0	1.11± 0.04^{b}	0.95± 0.03^{a}	0.85± 0.04^{ab}	0.97± 0.04
Difference	0.34	0.31	0.30	0.32	-34.17	-32.34	-84.7	-50.4	0.03	0.14	0.10	0.08
Surplus / deficit (%)	30.6	30.0	29.4	30.4	-29.5	-29.6	-78.4	-45.4	2.70	14.7	11.7	8.24

[1] DM intake= voluntary intake × DM (%) content of the feed / fodders.
[2] % DCP= DC/100 × CP %; Where: DC= digestibility coefficient as per Ranjhan (2001) and CP= crude protein content of feed / fodders.
[3] % of TDN, as per Martin (1985) and Chandler (1990) calculated as follows:
TDN (%) in straw= 96.4 – 1.15 × ADF (%)
TDN (%) in native grass= 105 - 0.68 × NDF (%)
TDN (%) in concentrates= 81.4 - 0.48 × NDF (%)
[4] The means within the same row with at least one common letter, do not have significant difference (P>0.05).
[5] Nutrient requirements as per Feeding Standard (FS) given by Ranjhan, (1998).

intake was 24.16 and 45.4% lower than the FS, respectively. Similar to the present observation, Fedel Bakshi *et al.* (2009) and Bishoni and Singh (2009) observed that DCP intake of lactating and dry cows was found to be in above the FS requirements. Similarly, Tiwary *et al.* (2007) reported that daily intake of DCP through different feed ingredients was 275.80 g/animal lead, which was equivalent to a feeding level that was 35.10% below the FS animal requirements. The results for lower DCP intake of heifers and calves were also in agreement with the observations of Mudgal *et al.* (2003) and Chaturvedi *et al.* (2009). The higher intake of DCP in case of lactating and dry cows was due to higher intake of concentrates than their requirements. The daily intake of TDN of lactating cows was significantly (P<0.05) lower in Karnah tehsil (3.10±0.10 kg) than that of Kupwara (4.32±0.11 kg) and Handwara tehsils (4.85±0.12 kg). This was 36.7, 55.9 and 7.6% above their nutrient requirements according to the FS. In dry cows the daily intake of TDN was significantly (P<0.05) lower in Karnah tehsil (2.49±0.12 kg) than that of Kupwara (3.43±0.14 kg) and Handwara tehsils (3.46±0.18 kg). The daily TDN intakes were 51.10, 48.49 and 11.6% above the animals' nutrient requirements in the respective tehsils.

In case of growing heifers the intake of TDN per day was significantly (P<0.05) higher for Handwara (2.48±0.13 kg) and Kupwara tehsils (2.29±0.16 kg) than that of Karnah tehsil (1.79±0.10 kg). The daily intake of TDN was 45.85, 60.0 and 18.54% above the FS for the respective tehsils. The daily intake of TDN of calves was 0.96±0.05, 0.95±0.05 and 0.84±0.04 kg for the respective tehsils. The intake was significantly (P<0.05) higher for Kupwara and Handwara tehsils than that of Karnah tehsil. The TDN intake was 2.7, 14.7 and 11.7% above the FS requirements of the animals in the respective tehsils. In the whole district the daily intake of TDN for lactating cows, dry cows, heifers and calves were 4.11±0.09, 3.14±0.12, 2.19±0.09 and 0.91±0.02 kg and was 34.31, 38.32, 42.20 and 24% above the FS, respectively.

The present observations were comparable to the findings of Bishoni and Singh (2009). However, the observations were different from that of Tiwary *et al.* (2007) who reported that the average TDN intake in adult cattle and buffalo was 3.62 kg/animal/d, which was deficient to the extent of 14.62%. Similarly, Mudgal *et al.* (2003), Singh *et al.* (2008) and Chaturvedi *et al.* (2009) reported that the TDN intake was lower than the animal's requirements according

to the FS. The higher intake of TDN in the study area may be due to sufficient supply of straw. The average daily milk yield (L/d/animal) was significantly (P<0.05) higher in Kupwara (4.89±0.37) and Handwara tehsils (4.69±0.28) compared to Karnah tehsil (3.76±0.28), Tiwary *et al.* (2007) also reported milk production 5.16±0.43 L/d/animal in Laksar tehsil and 5.60±0.90 in Roorkee tehsil. The low productivity irrespective of higher intake of macronutrients might be due to poor genetic potential and imbalanced feeding of animals. The milk fat (%) of lactating cattle was 4.8±0.4, 4.5±0.2 and 3.9±0.1 in the respective tehsils. The higher milk fat observed in Kupwara tehsil might be due to more number of cross bred cattle with higher nutrient intake. The milk urea nitrogen (MUN) concentration in the milk of the lactating cows was 18.55±0.74, 21.29±1.31 and 16.87±1.41 mg/dL for the respective tehsils. This was significantly (P<0.05) lower in Karnah tehsil than that of Handwara and Kupwara tehsil. This was higher than that recommended for well fed (11-16 mg/dL) animals (Wadhwa *et al.* 2005). The high MUN concentration was due to excessive feeding of concentrates to the lactating cattle in current study.

CONCLUSION

It was concluded that most of the farmers rear non-descript indigenous cattle of low body weight potentially to a general trend of under feeding protein in calves and sometimes growing heifers, which limits milk production. The genetic potential of the dairy cattle, nutrient imbalance in the diet and farmer awareness of balanced diets are also a potential problem.

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