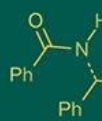


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Ramsawroop
Assistant Professor,
Department of Animal Science,
CCSHAU College of
Agriculture, Bawal, Haryana,
India

NS Maan
Department of Animal
Nutrition, LUVAS, Hisar,
Haryana, India

Jyotsana
Department of Animal
Nutrition, LUVAS, Hisar,
Haryana, India

Nancy Sheoran
Department of Animal
Nutrition, LUVAS, Hisar,
Haryana, India

Corresponding Author:
Ramsawroop
Assistant Professor,
Department of Animal Science,
CCSHAU College of
Agriculture, Bawal, Haryana,
India

Assessment of feeding practices and nutritional status of lactating cattle and buffaloes in paddy wheat growing zone of Haryana

Ramsawroop, NS Maan, Jyotsana and Nancy Sheoran

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Abstract

An extensive survey was carried out to record feeding practices and nutritional status of lactating cattle and buffaloes in paddy wheat growing zone of Haryana state. The survey was conducted during kharif season from June 2021 to November 2021. The survey covered all 53 blocks in eight districts of the paddy-wheat zone (Ambala, Panchkula, Yamunanagar, Kurukshetra, Kaithal, Panipat, Karnal and Sonapat) interviewing 636 families, including 318 cattle and 318 buffalo farmers, to provide a representative picture of the region. Through a personal approach at the doorsteps of individual farmers, data were collected to find out feeding practices. Samples of feeds, fodder, milk, hair and blood were also collected. Sorghum was the most common used green fodder used by 67% of farmers followed by maize fodder (26%) to fed as green fodder to their lactating cattle and buffaloes. In dry fodders, wheat straw was preferred over paddy straw and used in every block by most of the farmers (91%) followed by paddy straw (24%). Wheat grain (dalia) was the common energy source fed by most of the farmers (88%). Concentrate pellet was the supplement source of energy and protein used by 46% farmers. Mustard cake and cotton seed cake were the main source of protein used by 49% and 41% of farmers. Mineral mixture was provided by 30% of farmers whereas 40% of farmers included common salt in animal ration.

Average body weight and milk yield of the buffaloes was 514.86 kg and 10.40 kg per day, respectively which is higher than cattle (370.29 kg and 9.43 kg/day). Average CP intake of buffaloes was 1.30 kg/day which was 15.03% less than the requirements, whereas, cattle were receiving 1.18 kg CP per day which is 9.92 % less than the requirement. Average daily TDN intake by the buffaloes and cattle were 7.70 and 6.62 kg, respectively. Daily TDN intake was 4.22% and 2.79% less than requirement in case of the buffaloes and cattle respectively. This imbalance feeding was mainly due to lack of knowledge and awareness among farmers regarding composition of feeds and nutrient requirements of the animals.

Keywords: Survey, buffaloes, feeding practices, nutritional status

Introduction

Although India is ranked first in terms of its livestock population, the lactation yield per animal is regrettably quite low (Singh *et al.*, 2022) ^[18]. This unfortunate situation can primarily be attributed to the feeding of subpar feeds, particularly crop residues and agro-industrial by-products, which are commonly provided to animals in rural households (Sherasia *et al.*, 2016) ^[17]. The primary constraint to livestock development is the scarcity and fluctuation in the quality and quantity of animal feed supply throughout the year. Increased population and industrialization are making arable land scarce, and a large portion of the available arable land is being degraded as a result of human activities. To maximize the potential of dairy animals, the ration should be balanced, but the main constraint in most developing countries is a lack of quality feeds (Makkar, 2006) ^[10]. Most farmers adopt conventional feeding strategies based on available feeds and fodder. In general, farmers do not supplement mineral mixtures and common salt in animal rations, resulting in deficiency of vital minerals and different health concerns (Garg *et al.*, 2007) ^[6]. Proper buffalo feeding can increase milk production by 30-40%, so the current study was conducted to evaluate lactating cattle and buffalo feeding practices and recommend corrective measures for increased milk production and optimal health.

Materials and Methods

A detailed survey was conducted to compare the feeding practices and mineral status of lactating cattle and buffaloes in the paddy-wheat growing zone of Haryana state. The survey, carried out from June to November 2021, involved collecting data from farmers using a questionnaire and the assistance of local veterinary professionals. All 53 blocks across the eight districts in the zone were included to ensure a representative sample. In each block, six farming families with cattle and six families with buffaloes were interviewed, thus total 636 families were surveyed.

A questionnaire was prepared keeping in mind the objectives and various dimensions of the study. Individual animal owner was interrogated regarding the type of feedstuffs (dry fodder, green fodder, grains, cakes, mineral mixture and common salt) and their amount fed to their animals. The weight of animals was calculated by Shaeffer's formula.

Body Wt. (Kg) = $(L \times CG^2)/660$, Where CG is chest girth in inches. (Wangchuk *et al.*, 2018) [22]. This is the most common formula used for both cattle and buffaloes. A specially designed measuring tape with inch scale was used in this study.

The samples of straws, fodders and concentrates ingredients

offered to animals were collected from each block and feeding practices were recorded. Analysis of collected samples was done after drying samples of straws, fodders and concentrate ingredients, and these were ground and analysed for proximate principles (AOAC, 2007) [11].

The nutrients requirements of cattle and buffaloes were calculated on the basis of their body weight and production performance. The availability of DM, CP and TDN for each animal was calculated on basis of chemical composition of feed/fodder ingredients and their feed intake. Finally, the nutrient intake of animals was compared with the nutrient requirements (Ranjhan, 1998) [14] to find out their nutrient deficiencies/excesses. The data were subjected to statistical analysis to draw inferences (Snedecor & Cochran, 1994) [21].

Results and Discussion

The result of proximate composition and nutritive value of different feedstuffs fed to the cattle and buffaloes of paddy wheat growing zone has been presented in Table 1. The average values of the feedstuffs corroborated with the values reported by Ranjhan S.K. (1998) [14]. Variations observed in relation to proximate composition of the feedstuffs might be due to varietal differences, different processing techniques and possible adulterations.

Table 1: Chemical composition (%) and nutritive value (%) of feedstuffs used by farmers of paddy-wheat growing zone

Feedstuff	DM	CP	EE	CF	NFE	TDN*
Wheat straw	89.31 (88.27-91.70)	03.16 (02.52-03.71)	1.03 (0.91-1.41)	35.62 (33.14-37.72)	48.27 (45.63-50.17)	45.0
Paddy straw	89.50 (87.82-91.40)	04.31 (03.22-05.18)	1.42 (1.02-2.05)	41.38 (40.12-43.05)	34.76 (31.14-36.52)	40.0
Sorghum fodder	18.9 (16.77-21.54)	07.54 (05.12-09.44)	1.98 (1.31-3.27)	32.06 (28.67-34.93)	50.57 (46.87-53.78)	55.0
Maize fodder	17.30 (15.47-19.22)	08.94 (07.72-10.43)	1.14 (0.81-2.15)	29.45 (27.63-31.13)	52.53 (47.82-55.75)	60.0
Bajra fodder	19.20 (17.34-22.31)	03.68 (02.10-05.85)	1.33 (0.96-1.93)	37.12 (32.94-40.72)	48.75 (45.23-51.83)	52.0
Sugarcane top	21.60 (19.47-24.22)	04.82 (02.47-06.02)	1.71 (1.06-2.32)	33.60 (30.47-37.22)	50.37 (46.47-53.22)	45.0
Grasses/weeds	14.40 (12.54-18.62)	09.52 (06.15-11.45)	1.95 (1.31-2.64)	25.12 (21.64-29.36)	51.68 (46.53-55.73)	50.0
Wheat grain	89.15 (88.14-91.36)	11.23 (10.57-11.78)	2.48 (1.88-2.79)	04.22 (3.85-4.95)	77.31 (76.87-79.21)	82.0
Bajra grain	89.71 (87.43-90.87)	12.13 (11.50-12.97)	3.26 (3.07-3.84)	03.89 (2.74-4.07)	76.35 (74.04-77.82)	75.0
Cotton seed	88.61 (86.20-89.35)	20.21 (18.76-22.75)	16.47 (14.22-19.37)	21.30 (20.14-23.85)	36.11 (33.15-39.77)	88.0
Cotton seed cake	88.52 (87.14-90.51)	22.67 (19.30-25.14)	08.52 (7.81-9.42)	22.60 (20.17-25.16)	37.62 (34.40-39.57)	75.0
Mustard cake	90.14 (88.24-91.58)	35.10 (31.24-38.51)	8.19 (7.14-9.51)	09.21 (08.14-10.51)	40.82 (37.14-42.51)	78.0
Feed pellets	89.12 (87.32-91.17)	19.24 (16.54-21.12)	2.59 (1.95-2.96)	13.28 (11.42-14.26)	62.78 (60.70-65.48)	62.0
Wheat Bran	92.71 (90.12-93.25)	14.10 (11.69-15.25)	2.01 (1.19-2.74)	15.65 (14.66-18.21)	60.54 (57.18-62.87)	65.0

* Calculated values (Sen *et al.*, 1977)

Figures in Parenthesis indicate range.

Feedstuffs used by cattle and buffalo farmers of paddy-wheat growing zone are given in the Table 2. Sorghum was the most preferred green fodder fed by the farmers i.e., 67% farmers were feeding sorghum followed by maize fodder (26%) and grasses (24%). Sugarcane tops and bajra fodder were also used by 12% and 7% farmers in the zone, respectively. Although difference was not huge but sorghum was used more by cattle farmers (69%) than buffalo farmers

(66%). District-wise, sorghum was most popular green fodder among cattle farmers of Panipat district, whereas in case of buffaloes, it was more popular in Karnal and Sonapat. Similarly, maize fodder was used by a higher percentage of cattle farmers (29%) than buffalo farmers. Maize was more popular source of green fodder in Ambala and Yamunanagar districts. Bajra fodder was being used only in 3 districts namely Kaithal, Panipat and Sonapat.

Equal percentage (7%) of cattle and buffalo farmers used bajra fodder in the zone. A total of 12% farmers were using sugar-cane tops (Gola) in the zone depending on availability and sugarcane harvesting in the area. A higher percentage of buffalo farmers were using grasses and weeds as a source of green.

Among dry roughages, it was observed that wheat straw was fed by majority of farmers (91%) than rice straw (24%). Comparatively a higher percentage of buffalo farmers (92%) were using wheat straw than cattle farmers (90%). Sonipat was the district where wheat straw was most popular dry roughage and used by 98% farmers. Rice straw was not popular and people were reluctant to feed it however, it was being utilised in the scarcity of wheat straw.

It was found that wheat grain was most popular as source of energy and was used by 88% of farmers in the zone followed by bajra grain by only 8% of farmers. Bajra grain was being used in Panipat and Sonipat districts only. Wheat was used by a higher percentage of buffalo farmers (90%) than cattle farmers (87%). Wheat was most popular in Karnal and Kurukshetra districts. Among protein sources, mustard cake was most popular, 49% farmers of the zone were using it. Mustard cake was used by a higher percentage of cattle farmers (54%) than buffalo farmers (44%), whereas cotton seed cake and cotton seed were more popular protein source among buffalo farmers & were used by 43 and 15% buffalo farmers, respectively.

Farmers argued that by feeding cotton seed there is increase in milk fat. Feeding of mustard cake was more popular in case of lactating cattle while farmers with buffaloes preferred cotton seed cake. There was evidenced that feeding cotton seeds and other oilseeds like soyabean or sunflower (Maynard *et al.*, 1979) ^[11] caused significant increase in the milk fat content. However, there was significant ($P < 0.01$) increase in fat-corrected milk (FCM) yield in Murrah buffaloes due to higher level of cotton seeds in rations (Grewal, 1993) ^[7].

Farmers were using 'Su' (Taramira) in the ration of post calving animals upto 10-15 days. Farmers believed that it helps in early involution uterus so that animal sets into estrus cycle early. Farmers believed that it increases milk production and the palatability of feed. Animal owners were offering better quality of concentrates and variety of concentrates to high milk yielding animals. Farmers with good economic status were also feeding more varieties of concentrates to their animals and preferred ready-made concentrate mixture or pelleted feed from reputed brands. Similar observations were also reported by Dahiya (2001) ^[5] and Baloda (2016) ^[2] in study conducted on feeding practices in Haryana state.

Comparatively a greater number of cattle farmers were using pelleted feed. The practice of feeding pellet feed was found to be the most popular in the Panchkula. Wheat bran was also being used by 30% farmers in the zone and comparatively by higher percentage of buffalo farmers (35%). Mineral mixture was used by 35% buffalo farmers which is higher than that of cattle. In case of cattle 25% farmers were using mineral mixture. A total of 40% farmers used to add salt in dietary regimen of lactating animals. Almost similar pattern of using salt in lactating animals of both the species was observed in all the districts of the zone. The study revealed that average daily TDN intake was 6.62 kg for cattle and 7.7 kg for buffaloes, with deficiencies of

2.79% and 4.22%, respectively. About 66% of animals received adequate TDN, while 20% had deficient and 12% had excess intake. Cattle received adequate dry matter (DM), whereas buffaloes consumed 11% less than required, primarily due to farmers' limited knowledge of species-specific nutritional needs. Protein intake was deficient in both species, with cattle and buffaloes receiving 9.92% and 15.03% less crude protein than required, respectively, affecting 50% of cattle and 58% of buffaloes.

The use of wheat as a primary concentrate and limited access to protein-rich cakes due to cost and availability contributed to these deficiencies. Additionally, 25% of cattle farmers and 35% of buffalo farmers provided mineral mixtures, highlighting a need for improved feeding practices and awareness.

The excess energy fed which get deposited in animal body which might be beneficial during lean period, when the dry and low-quality roughages constitute the major part of the diet and energy intake is limited especially in high yielders. When the requirement of energy and protein was not met, the milch animals draw stored fat and protein to supply energy and amino acids for milk production. Thus, deposited energy will help in maintaining persistency in milk production. Broster *et al.* (1977) ^[3] from his study concluded that persistency of production was influenced by nutrient intake and body nutrient stores.

Clark and Davis (1980) ^[4] revealed that deficient protein was being fed to the animals as compared to their requirements. This difference in protein intake might be due to the economic status of the farmers. Feeding diets sufficiently high in crude protein for maximum milk production may not be always profitable.

Satter *et al.* (1979) ^[15] investigated that the most profitable amount of crude protein to be fed will vary from time to time depending on the prices of protein supplement and price of milk. The protein supplements are costlier and there is little scope of utilizing excess protein to yields energy for milk production. Therefore, there is scope of only slight increasing protein in their ration to render the production system more economical by providing more green fodder and homemade concentrates result were in same pattern of Singh (1977) ^[20] carried out a survey in Hisar district and reported improved feeding status of buffaloes, where the milch buffaloes were found to be fed 7.4% and 14.87% excess TDN and CP, respectively and the average milk yield was 8.77 kg. The results of this study were in general agreement to the study conducted by Singh (1977) ^[20] and also to that of another study conducted by Singh *et al.* (2002) ^[19] who reported that buffaloes in Mohindergarh district were found to be fed 7.54% excess TDN and 7.41 % deficient CP. Similar to this, excess TDN and deficit CP in ration of buffaloes of Gurgaon district were also reported by Baloda (2016) ^[2] and Randhe *et al.* (1993) ^[13] carried a study on nutritional status of different categories of buffaloes owned by farmers with different land holding in Maharashtra revealed that there was deficiency of DM supply in all the groups and Jarial *et al.* (2013) ^[8] too revealed that in Tehri Garhwal and Pithoragarh districts of Uttarakhand, the lactating buffaloes were underfed in terms of DM while Maan *et al.* (2014) ^[9] surveyed the feeding practices in Bhiwani district and found that farmers generally were not supplementing mineral mixture and common salt in ration of lactating buffaloes.

Table 2: Comparative feeding of different feedstuffs by cattle and buffalo farmers of paddy-wheat growing zone

Feedstuffs	Species	Total (318)	Ambala (36)	Kaithal (42)	Karnal (48)	Kurukshetra (42)	Panchkula (24)	Panipat (36)	Sonipat (48)	Yamunanagar (42)
Sorghum fodder	Cattle	221(69%)	26(72%)	32(76%)	35(73%)	29(69%)	8(33%)	29(81%)	32(67%)	30(71%)
	Buffalo	210(66%)	23(64%)	28(67%)	34(71%)	26(62%)	13(54%)	25(69%)	34(71%)	27(64%)
Maize fodder	Cattle	91(29%)	15(42%)	10(24%)	13(27%)	14(33%)	8(33%)	7(19%)	7(15%)	17(40%)
	Buffalo	79(25%)	13(36%)	12(29%)	13(27%)	11(26%)	5(21%)	6(17%)	3(06%)	16(38%)
Bajra fodder	Cattle	22(07%)	0(00%)	5(12%)	0(00%)	0(00%)	0(00%)	5(14%)	12(25%)	0(00%)
	Buffalo	22(07%)	0(00%)	5(12%)	0(00%)	0(00%)	0(00%)	3(08%)	14(29%)	0(00%)
Sugarcane tops	Cattle	35(11%)	5(14%)	5(12%)	7(14%)	6(14%)	0(00%)	2(06%)	0(00%)	10(24%)
	Buffalo	45(14%)	10(28%)	5(12%)	8(16%)	7(17%)	0(00%)	3(08%)	0(00%)	12(29%)
Grasses	Cattle	68(21%)	4(11%)	10(24%)	12(25%)	6(14%)	12(50%)	9(25%)	10(21%)	5(12%)
	Buffalo	90(28%)	12(33%)	13(31%)	15(31%)	11(26%)	8(33%)	10(28%)	15(31%)	6(14%)
Wheat straw	Cattle	287(90%)	29(81%)	40(95%)	45(94%)	35(83%)	22(92%)	35(97%)	47(98%)	34(81%)
	Buffalo	293(92%)	34(94%)	37(88%)	42(88%)	37(88%)	22(92%)	34(94%)	47(98%)	40(95%)
Paddy straw	Cattle	82(26%)	15(42%)	7(17%)	13(27%)	13(31%)	3(13%)	7(19%)	6(13%)	18(43%)
	Buffalo	69(22%)	6(17%)	17(40%)	14(29%)	10(24%)	4(17%)	7(19%)	4(08%)	7(17%)
Wheat flour/dalia	Cattle	276(87%)	32(89%)	37(88%)	46(96%)	40(95%)	12(50%)	33(92%)	43(90%)	33(79%)
	Buffalo	285(90%)	35(97%)	41(98%)	48(100%)	42(100%)	17(71%)	35(97%)	39(81%)	28(67%)
Bajra grain	Cattle	28(09%)	0(00%)	0(00%)	0(00%)	0(00%)	0(00%)	12(33%)	16(33%)	0(00%)
	Buffalo	27(08%)	0(00%)	0(00%)	0(00%)	0(00%)	0(00%)	9(25%)	18(38%)	0(00%)
Cotton seed	Cattle	38(12%)	4(11%)	7(17%)	5(10%)	8(19%)	0(00%)	2(6%)	8(17%)	4(10%)
	Buffalo	49(15%)	3(08%)	6(14%)	11(23%)	5(12%)	4(17%)	6(17%)	10(21%)	4(10%)
Cotton seed cake	Cattle	124(39%)	15(42%)	13(31%)	17(35%)	11(26%)	7(29%)	18(50%)	25(52%)	18(43%)
	Buffalo	138(43%)	16(44%)	20(48%)	21(44%)	17(40%)	3(13%)	16(44%)	26(54%)	19(45%)
Mustard cake	Cattle	171(54%)	18(50%)	22(52%)	26(54%)	21(50%)	16(67%)	18(50%)	28(58%)	22(52%)
	Buffalo	139(44%)	15(42%)	21(50%)	22(46%)	20(48%)	9(38%)	14(39%)	21(44%)	17(40%)
Palleted Feed	Cattle	157(49%)	13(36%)	23(55%)	27(56%)	19(45%)	18(75%)	21(58%)	22(46%)	14(33%)
	Buffalo	136(43%)	18(50%)	12(29%)	13(27%)	15(36%)	20(83%)	17(47%)	18(38%)	23(55%)
Wheat bran	Cattle	84(26%)	9(25%)	12(29%)	16(33%)	11(26%)	8(33%)	9(25%)	9(19%)	10(24%)
	Buffalo	109(34%)	14(39%)	20(48%)	20(42%)	17(40%)	7(29%)	8(22%)	6(13%)	17(40%)
Mineral mixture	Cattle	81(25%)	6(17%)	11(26%)	15(31%)	11(26%)	8(33%)	9(25%)	14(29%)	7(17%)
	Buffalo	116(36%)	10(28%)	19(45%)	20(42%)	14(33%)	8(33%)	13(36%)	20(42%)	12(29%)
Common Salt	Cattle	124(39%)	16(44%)	13(31%)	17(35%)	14(33%)	8(33%)	15(42%)	23(48%)	18(43%)
	Buffalo	132(42%)	17(47%)	17(40%)	16(33%)	16(38%)	8(33%)	16(44%)	22(46%)	20(48%)

Table 3: Comparative feeding plane and nutrient intake of cattle and buffaloes in paddy growing regions

Attribute	Cattle	Buffaloes
Average body weight (kg)	370.29±2.18	514.86±2.10
Average milk yield (kg/d)	9.43±0.12	10.40±0.12
Total DM intake (kg/d)	10.37±0.08	13.73±0.08
Total DM required (kg/d)	10.18±0.06	15.44±0.05
DM deficit/excess (%)	+ 00.19 %	-11.07%
Animals with DM deficient more than 30%	05.97% (19)	05.66% (24)
Animals with DM deficient more than 20%	11.63% (37)	08.80% (48)
Animals with DM deficient more than 10%	32.70% (104)	35.85% (115)
Animals with DM at par	47.48% (151)	48.11% (127)
Animals with DM excess by more than 10%	01.26% (04)	01.57% (04)
Animals with DM excess by more than 20%	00.94% (03)	00.00% (00)
Animals with DM excess by more than 30%	00.00% (00)	00.00% (00)
Total CP intake (kg/d)	1.18±0.01	1.30±0.01
Total CP required (kg/d)	1.31±0.01	1.53±0.01
CP deficit/excess (%)	-09.92 %	-15.03%
Animals with CP deficient more than 30%	17.61% (56)	20.12% (64)
Animals with CP deficient more than 20%	26.41% (84)	26.73% (85)
Animals with CP deficient more than 10%	20.12% (64)	21.07% (67)
Animals with CP at par	31.76% (101)	28.93% (92)
Animals with CP excess by more than 10%	03.46% (11)	03.14% (10)
Animals with CP excess by more than 20%	00.62% (02)	00.00% (00)
Animals with CP excess by more than 30%	00.00% (00)	00.00% (00)
Total TDN intake (kg/d)	6.62±0.05	7.70±0.05
Total TDN required (kg/d)	6.81±0.05	8.04±0.05
TDN deficit/excess (%)	-02.79%	-04.22%
Animals with TDN deficient more than 30%	00.94% (03)	00.94% (03)
Animals with TDN deficient more than 20%	03.46% (11)	02.83% (09)
Animals with TDN deficient more than 10%	16.67% (53)	19.18% (61)
Animals with TDN at par	66.04% (210)	64.46% (205)
Animals with TDN excess by more than 10%	11.32% (36)	11.00% (35)
Animals with TDN excess by more than 20%	01.57% (05)	01.57% (05)
Animals with TDN excess by more than 30%	00.00% (00)	00.00% (00)

*Values in parentheses represent the no. of animals

Conclusion

Farmers in the paddy-wheat growing zone primarily utilized locally available feed resources, including sorghum, maize, bajra fodder, grasses, and crop residues like wheat and rice straw. Concentrates such as mustard cake, cottonseed, cottonseed cake, wheat grain, and bajra grain were used as protein and energy sources, with limited use of mineral mixtures and common salt. Some farmers followed steaming-up practices for pregnant animals.

Sorghum fodder was most popular due to its drought resistance, and both green and dry fodders were commonly fed in chopped form. While cattle received adequate dry matter (DM), buffaloes fell short by 11%, with protein intake being deficient in both species—9.92% for cattle and 15.03% for buffaloes. Buffaloes yielded higher milk (10.40 kg/day) than cattle (9.43 kg/day). Nutrient compositions of feedstuffs were within normal ranges, though nutritional imbalances were observed, highlighting the need for improved feeding practices to optimize productivity.

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