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Nutritional status of lactating buffaloes in Katni district of Madhya Pradesh

Ramesh Kumar Mishra, RPS Baghel, Rahul Sharma and Shivangi Sharma

Abstract
A survey study was conducted to see the nutritional status of lactating buffaloes in Katni district of Madhya Pradesh. The survey data obtained revealed that buffaloes in Katni district were generally thriving on the grazing land. Wheat straw and paddy straw were the main dry roughage used for feeding of animals. Concentrate was mostly given to medium and high yielders. None of the respondents were aware about feeding standards and nutrient recommendations. Most of the respondents were occasionly providing common salt and rarely mineral mixture to their animals. Therefore, the animals were generally deprived of certain nutrients and were also suffering from nutritional deficiencies. In existing feeding practices, lactating buffaloes were mostly deficient in CP, TDN, Ca, P, Cu and Zn which has to be supplemented through diet to exploite yield potential of buffaloes.

Keywords: Lactation, buffalo, nutritional status

Introduction
In spite of highest milk producers in the world, the productivity of our milch animals is very low. The main constraint to livestock development in developing countries is the scarcity and fluctuation in the quality and quantity of animal feed (Makkar, 2006) [12]. The crop residues and agro-industrial by products forms the bulk of the ration supply to the animals resulting in less availability of nutrients to the lactating animals. The crop residues and local grasses are deficient in protein and certain minerals.

The inadequate supply of quality feed and improper feeding management limits the availability of important nutrients to the animal during critical period of their production cycle. In India, ruminants depend on straw for their maintenance. The production requirement was most often met from protein supplements like groundnut cake, mustard cake or cottonseed cake (Lailer and Singh, 1998) [11] and very seldom from compounded concentrate mixture (Prasad *et al*., 1993) [17] which affects the farm economics.

The buffaloes in the Katni district generally thrive on grazing and only limited numbers of medium and large farmers were providing concentrate to their lactating and advance pregnant buffaloes. The crop residues and agro-industrial byproducts forms main part of animals ration. Dwivedi and Kaul (1999) [6] and Garg *et al.* (2007) [7] also noticed that crop residues and agro-industrial byproducts contribute major share in animal ration in their area of study. Wheat straw and paddy straw were the main roughage fed to the buffaloes in Katani district. Akbar *et al.* (2006) [2] and Ramesh *et al.* (2006) [18] were also found similar observations in other part of countery. The available feed ingredients with farmers of the district were deprived off certain nutrients especially in protein and minerals to their animals. Earliar researchers like Bhanderi *et al.* (2009) [4], Patil *et al.* (2009) [16], Singh *et al.* (2012) [22] and Indira and Samuel (2014) [8] observed deficiency of nutrients in animals because of animal mainaly dependent on poor quality feed ingredients as also noticed in the District.

Material and methods
- Katni is situated at 23.83^0 latitude and 80.40^0 longitudes at 392 MSL in the southern part of second agro-climate zone, including Kymore plateau and Satpura hills of Madhya Pradesh. The climate of the district resembles to that of tropical regions with hot summer and cold winters. The temperature goes up to 48^0C during summer while it falls to 4^0C in winter. The district receives average 1050 mm average rainfall in a year.
- Multi-stage stratified random sampling procedure was used for the selection of villages. The five blocks of Katni district were selected purposively for the survey study.

A total of 36 stall fed lactating buffaloes were sallected from 500 animal rears and buffaloes were grouped in to three groups (12 buffaloes in each group) on the basis of body weight and milk yield ie. Group - I: Buffaloes weighing 350± 6.74 Kg yielding 4.0±0.33 liter milk per day, Group -II: Buffaloes weighing 400±7.31 Kg body weight yielding 4.0±0.46 liter milk per day and Group - III: Buffaloes weighing 450±6.18 Kg yielding 8.0±0.39 liter milk per day.The data were also collected from individual buffalo owner through personal interview regarding the feeding practices and production status of animals.

- The representative samples of straws, fodders, concentrate ingradients and concentrate mixtures offered to the animals were collected from each village. The dried sample of concentrate mixture, straws, green fodders were ground to pass through1mm sieve, pooled it and samples were analyzed for proximate principles as per A.O.A.C. (1990) [1] and minerals by atomic absorption spectrophotometer (AAS).
- The nutrients requirement of the buffaloes was calculated based on their body weight and production performance. The availability of DM, CP, TDN and mineral elements (Ca, P, Fe, Cu, Mn & Zn) for each animal was calculated on the basis of chemical composition of feed/fodder ingradients and their feed intake. Finally, the nutrients intake of the animals was compared with the nutrient requirements (Kearl, 1982) [10] to work out their nutrient deficiencies/ excess.
- The weight of animals was taken by the Mullick's formula for buffalo (Sastry *et al.*, 1982). X = 25.156 (Y) - 960.232. Where, X= Estimate of body weight in lbs, Y= heart girth in inches. Pound will be converted to kilogram by dividing with the factor 2.2. The average feed intake of each animal was calculated by measureing feed offered and left over record of four consecutive days. Milk yield was recorded in the morning and evening for four consecutive days.

Results and discussion

The feeding practices followed in the surveyed area of Katni district indicated that farmers were not following any scientific feeding practices and they do not have any knowledge of feeding standard and nutrient recommendations of any agency. The milk yield was the main basis of feeding concentrate. Preparation of balance concentrate mixture was not common practice, individual concentrate ingredients as such or in crushed condition were mainly used for feeding in buffaloes. Mostly the animals were allowed to graze for aprox 6-8 hours in a day along with twice stall feeding. The green fodders mostly pasture grass, sorghum, maize and berseem was in practice for feeding either in unchoppeed or chopped condition. Among surveyed areas, wheat straw was the first choice as dry fodder followed by paddy straw and pulses straw in Katni district. In the district farmers were occasionally providing common salt to their animals. The feeding of mineral mixture in the animal ration was very seldom. The concentrate feeding was most common among buffaloes of fair to high yielders although quantity were unsatisfactory. On the basis of values obtained from feed analysis, nutrient intake of animal per day and it's requirements calculated as per Kerl (1982) [10] feeding standard, deficiency or excess of nutrient on existing feeding practices were worked out which have been presented in Table 2(a & b).

Table 1: Proximate composition of feed ingredients of Katni district (%)

Ingredients	DM	CP	EE	CF	NFE	Ash
Sorghum Chari	25.60 ±0.06	07.91 ±0.06	3.31 ±0.10	26.21 ±0.06	54.16 ±0.25	08.42 ±0.33
Pasture grass	20.13 ±0.14	05.40 ±0.10	5.21 ±0.17	28.56 ±0.16	48.28 ±0.31	12.55 ±0.20
Wheat straw	90.80 ±0.10	03.12 ±0.04	1.14 ±0.07	38.55 ±0.11	45.68 ±0.22	11.57 ±0.25
Paddy straw	90.20 ±0.06	03.14 ±0.02	1.34 ±0.09	36.31 ±0.06	48.21 ±0.27	12.55 ±0.36
Mustard cake	91.50 ±0.07	34.78 ±0.06	9.86 ±0.06	10.16 ±0.06	36.10 ±0.21	09.10 ±0.22
Wheat bran	90.81 ±0.06	13.82 ±0.20	4.22 ±0.13	10.18 ±0.20	63.92 ±0.30	07.92 ±0.30
Rice bran	91.10 ±0.15	11.31 ±0.07	8.30 ±0.09	19.21 ±0,12	49.10 ±0.23	12.10 ±0.24
Rahar Chuni	91.31 ±0.11	14.35 ±0.15	2.34 ±0.10	22.14 ±0,07	54.03 ±0.19	07.19 ±0.19

Table 2: Mineral content of feed ingredients used in Katni district

Ingredients	Ca (%)	P (%)	Fe (ppm)	Cu (ppm)	Mn (ppm)	Zn (ppm)
Sorghum Chari	0.30±0.09	0.11±0.06	385.68±0.45	05.73±0.16	72.31±0.35	15.54±0.06
Pasture grass	0.44±0.15	0.09±0.07	225.01±0.51	06.12±0.11	46.81±0.27	24.14±0.08
Wheat straw	0.21±0.09	0.06±0.02	269.41±0.67	04.19±0.16	62.88±0.20	23.47±0.04
Paddy straw	0.40±0.11	0.09±0.03	478.52±0.33	01.44±0.10	126.06±0.76	17.84±0.02
Mustard cake	0.81±0.21	1.05±0.21	527.17±0.78	28.79±0.21	58.20±0.56	76.64±0.07
Wheat bran	0.17±0.07	1.26±0.15	139.38±0.33	11.44±0.22	89.53±0.37	56.76±0.04
Rice bran	0.12±0.04	1.36±0.25	648.37±0.86	17.81±0.15	104.26±0.39	61.08±0.02
Rahar Chuni	0.47±0.15	0.56±0.06	334.52±0.61	14.63±0.07	46.77±0.41	21.32±0.06

Table 2(a): Nutritional status of lactating buffalos in surveyed area of Katni district

Category of animal	Parameter	DM (Kg)	CP (Kg)	TDN (Kg)	Ca (g)	P (g)
Group-I (350±6.74 Kg BW yield 4.0±0.33 L/day)	Intake	8.75±1.21	0.52±0.34	4.39±0.87	27.73±1.34	15.20±3.30
	Requirement	8.40	0.87	4.60	27.01	21.04
	Excess / Deficit (-)	0.35±0.15	-0.35±0.16	-0.21±0.11	0.72±0.17	-5.84±0.79
	%	4.17	-40.23	-4.57	2.67	-27.76
Group-II (400±7.31 Kg BW yield 4.0±0.46 L/day)	Intake	9.25±0.26	0.55±0.45	4.60±0.27	29.06±0.23	15.96±0.26
	Requirement	9.00	0.91	5.03	30.02	23.01
	Excess / Deficit (-)	0.25±0.15	-0.36±0.12	-0.43±0.23	-0.96±0.15	-7.05±0.07
	%	2.77	-39.56	-8.55	-3.20	-30.64
Group-III (450±6.18 Kg BW yield 8.0±0.39 L/day)	Intake	13.15±0.41	1.20±0.23	7.11±0.38	36.36±0.11	46.01±0.19
	Requirement	13.24	1.46	7.24	44.40	34.80
	Excess / Deficit (-)	-0.09±0.12	-0.26±0.09	-0.13±0.11	-8.04±0.19	11.21±0.25
	%	-0.68	-17.81	-1.80	-18.11	32.21

Table 2 (b): Trace minerals excess/deficiency observed in lactating buffaloes of surveyed area of Katni district

Category of animal	Parameter	Fe (ppm)	Cu (ppm)	Mn (ppm)	Zn (ppm)
Group-I 350±6.74 Kg BW (yield 4.0±0.33 L/day)	Intake	958.51±19.11	55.54±6.36	525.33±22.19	222.63±21.23
	Requirement	420.00	84.00	336.00	336.00
	Excess / Deficit (-)	538.51±11.01	-28.46±2.10	189.33±4.08	-113.37±3.21
	%	128.22	-33.88	56.35	-33.74
Group-II 400±7.31 Kg BW (yield 4.0±0.46 L/day)	Intake	977.31±22.16	58.76±3.06	556.54±15.03	236.79±21.16
	Requirement	450.00	90.00	360.00	360.00
	Excess / Deficit (-)	527.31±20.00	-31.24±0.51	196.54±11.12	-123.21±6.15
	%	117.18	-34.71	54.59	-34.23
Group-III 450±6.18 Kg BW (yield 8.0±0.39 L/day)	Intake	763.18±20.16	106.50±15.42	844.05±35.00	383.66±27.01
	Requirement	662.00	132.40	529.60	529.60
	Excess / Deficit (-)	101.18±6.11	-25.90±2.14	314.45±22.06	-145.94±10.30
	%	15.28	-19.56	59.38	-27.56

Dry matter intake of buffaloes weighing approximately 350 Kg or 400 Kg yielding 4.0 liters milk daily was 4.17% and 2.77%, respectively over the requirements. Whereas, high yielding buffaloes weighing approx 450 Kg body weight producing 8.0 liters milk daily were stressed for shortage of dry matter. As regards protein intake in buffaloes, shortage of 40.23%, 39.56% and 17.81% protein in buffaloes having 350 Kg B. W. with 4.0 liters milk, 400 Kg B. W. with 4.0 liters milk and 450 Kg B. W. with 8.0 liters milk per day, respectively was recorded. The lactating buffaloes were also deficient in TDN intake although shortage was less.

The existing feeding practices had satisfied the calcium (Ca) requirement of buffaloes weighing 350 Kg b. wt. which was 2.67% over the requirement but shortage of 3.20% and 18.10 % were observed, respectively in those weighing 400 Kg with 4.0 liters and 450 Kg with 8.0 liters milk daily. The demand of phosphorus (P) in lactating buffaloes yielding up to 4.0 liters milk per day was not achieved from existing feeding practices. The deficiency was 27.76% and 30.64% in buffaloes weigh 350 and 400 Kg body weights, respectively. The iron (Fe) and manganese (Mn) requirement of buffaloes of all categories were fulfilled in existing feeding practices. While, copper (Cu), and zinc (Zn) were deficient.

The over intake of dry matter by buffaloes were recorded in the study area of Katni district. Similar findings were reported by Nagalakshmi *et al.* (2006a) [14], Nagalakshmi *et al.* (2006b) [15], Ramesh *et al*. (2006) [18] and Singh *et al.* (2006) [20] in their area of study where farmers used to feed their animals over the requirement. The over intake of DM was probably because of low nutrient density in the ration and high demand for nutrient during early and mid-lactation.

The data regarding protein intake of buffaloes revealed that present feeding practices adopted by respondents were insufficient to provide adequate quantity of CP to the lactating buffaloes as per their requirement. Similar conditions were also noticed by Ramesh *et al*. (2006) [18], Singh *et al.* (2006) [20], Tiwari *et al.* (2007) [23], Patil *et al.* (2009) [16] and Jain *et al*. (2012) [9] regarding feeding practices adopted by the farmers of their areas. The shortage of crude protein was noticed in lactating buffaloes because buffaloes were mostly depending on cereal straws which are devoid of protein and supply of concentrate was in very insufficient quantity. The deficiency was most prominent in low yielder probably because of less profit per animal and high cost of concentrate which restricted the farmers to purchase and provide concentrate to such buffaloes.

The buffaloes were also deficient in TDN intake in present feeding practices followed by respondent for lactating buffaloes in the Katni district. Similar findings were reported by Singh *et al.* (2006) [21], Tiwari *et al.* (2007) [23], Patil *et al.* (2009) [16] and Jain *et al*. (2012) [9]. On the other hand Nagalakshmi *et al.* (2006 a, b) [14, 15], and Ramesh *et al.* (2006) [18] found marginal to moderately excess TDN intake in buffaloes of their area of study. The main reason of deficient supply of TDN to buffaloes in the present area was mainly because the buffaloes were mostly depending on cereal straws and there was low incorporation of concentrate in their ration. The shortage of CP and TDN was greater in low yielding than the buffaloes yielding more than 8.0 liters milk per day because farmers preferred to give greater quantity of green fodder and concentrate to buffaloes yielding higher quantity of milk.

The existing feeding practices fulfills the calcium (Ca) requirement of buffaloes with low body weight and low production because of their lesser requirement but deficiency had increased in the buffaloes with increase in milk yield. The deficiency of Ca in lactating buffaloes had been also reported by Garg *et al*. (2007) [7], Bhanderi *et al.* (2009) [4], Jain *et al*. (2012) [9], Bhanderi *et al.* (2013) [3], Maurya and Singh (2015) [13]. While, Dhakad and Jain (2013) [5] noticed that there is need of regular supply of Ca and P in dairy animals. In the existing feeding practices, the amount of green grasses and concentrates fed by the farmers were able to meet the requirement of buffaloes of low body weight with medium level of production but it had not satisfied the requirement of high yielding buffaloes yielding more than four liters of milk. Hence, supplementation of Ca through mineral mixture in buffalo diet was found necessary for their better performance. The phosphorus (P) requirement was not fulfilled in buffaloes with low level of productivity and it was deficient in the animals in existing feeding practices adopted by the farmers. It was mainly attributed to poor P content in the roughages available in the area and scarcity of concentrate in the ration of buffaloes in rural areas of the district. However, deficiency was not much pronounced in high yielders because they were getting sufficient quantity of concentrates containing cereal brans, chunies and oilseed cakes which were the good sources of P. Hence, phosphorus requirement was fulfilled in buffaloes reared on such feed. Deficiency of P as observed in the lactating buffaloes of present studies had been also reported by previous researchers (Tiwari *et al*., 2007; Bhanderi *et al*., 2009, Patil *et al*., 2009; Jain *et al*., 2012; Bhanderi *et al*., 2013; Maurya and Singh., 2015) [3, 4, 9, 13, 16, 23] in their area of study.

The requirement of iron (Fe) and manganese (Mn) of buffaloes of all categories were fulfilled in existing feeding practices adopted by the farmers to their animals because the concentration of these two minerals were rich in roughages and feed ingredients available in Katni district. Similar to our studies, deficiency of Fe was also not noticed by previous workers (Garg *et al*., 2007; Tiwari *et al*., 2007; Bhanderi *et al*., 2009 and Patil *et al*., 2009) [7, 23, 4, 16]. Buffaloes of all

categories were deficient for copper (Cu) and zinc (Zn) in Katni district. Bhanderi *et al.* (2013) [4] also reported deficiency of these minerals in buffalo ration in their area of study. The deficiency of these trace minerals was mainly attributed to its low concentration in the feed ingredients and its non-supplementation through feed in the present feeding practices adopted by the farmers.

Conclusion

The animals in Katni district were generally thriving on poor quality roughages and only limited numbers of medium and large farmers were providing concentrate to them. Therefore, the animals were generally deprived off certain nutrients and were also suffering from nutritional deficiencies. In existing feeding practices, lactating buffaloes were mostly deficient in CP, TDN, Ca, P, Cu and Zn which has to be supplemented through diet to exploite reproductive and yield potential of buffaloes.

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