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Dr. Vivekin Pachauri
Deputy Director, Department of Social Justice and Disabled Persons Welfare, Directorate, Bhopal, Madhya Pradesh, India

Dr. SK Mishra
Assistant Professor, JNKVV – Dryland Horticulture Research & Training Centre, Garhakota, Sagar, Madhya Pradesh, India

Corresponding Author
Dr. Vivekin Pachauri
Deputy Director, Department of Social Justice and Disabled Persons Welfare, Directorate, Bhopal, Madhya Pradesh, India

Study of nutrient requirement of milking cows and evaluation of excess or deficit of energy and protein in the balance diet

Dr. Vivekin Pachauri and Dr. SK Mishra

Abstract
The high producing milking cow requires a diet that supplies the nutrient needs for high milk production. Lactating cows should be fed an array of protein supplement instead of one type. The primary sources of Energy to dairy cattle are carbohydrates. Protein is typically measured in feed stuffs as crude protein (CP) which is defined as the % N in a feed multiplied by 6.25 present study was conducted in 20 lactating cows to evaluate excess or deficit of energy and protein in the balance diet & nutrient requirement of milch cows. Milking animals were strategically supplemented as per their nutrient requirement according to their maintenance and production. In Group A the percent excess of nutrients in terms of DCP and TDN was 22.85% and 24.15% and in group B the percent excess of nutrient in terms of DCP and TDN was 18.59% and 24.87%.

Keywords: Ruminants, feed efficiency, dry fodder, concentrate, dietary treatment, milch

Introduction
Introduction in India, agricultural prosperity is intimately associated with the livestock development. Livestock rearing being the major source of income. Animal productivity is a major part of agricultural productivity and plays important role in the national economy. Feed factors also affect DMI. Total ration moisture concentrations >50% generally decrease DMI, although this may be related more to fermentation characteristics than to moisture per se, because high-moisture feeds for dairy cattle are typically from fermented (ensiled) sources. Rations high (>30%) in neutral detergent fiber (NDF) may also limit feed intake of cows, although the degree to which this occurs is related to the source of NDF. Environment also affects feed intake with temperatures above the thermal neutral zone (>20°C [68°F]), resulting in reduced DMI. Monitoring DMI, when possible, is a useful tool in diagnosing nutritional problems in diets of dairy cows.

Large ruminants such as cattle continue to play an important role in the livestock production system in India. Indian cattle breeds are of smaller mature body size, grow at slower rate and produce a low quantity of milk as compared to the breeds found in temperate countries. However, the breeds are hardy, and well adapted to heat stress and poor quality diets, a situation which is characteristic of tropical countries. The nutrient needs of these animals probably differ from those prescribed in the feeding standards of temperate countries (NRC, 1989; AFRC, 1990) [5, 2] because of differences in genetic makeup, mature body size and growth rate, quality of feeds, climatic conditions and differences in efficiency of nutrient utilization. Very few studies have been conducted so far to measure nutritional requirements of tropical breeds, which is perhaps the most important consideration to obtain the best efficiency in any type of production system. Knowing the properties of the feed is equally important.

The appropriate feeding standards for these animals are not yet clearly defined, there being wide differences (as high as 40%) in nutrient requirements prescribed by existing feeding standards. Although western countries have adopted RDP and UDP system and NE for expressing protein and energy requirements, India and many tropical countries still continues to use CP and DCP, TDN or ME for expressing nutritive values of feeds and feeding standards. Most of the available publications on feeding trials on lactating cattle in India reported nutritive values of feed in terms of CP, DCP, TDN and ME. The feeding standards for cattle, which are currently being followed in India (Kearl, 1982; ICAR, 1998) [5, 3], are based on only a few feeding trials. As these standards were developed from a small database, they do not reflect requirements for widely different planes of nutrition, quality of feed or individual variations under the diversified tropical conditions prevailing in India.

An optimum milk production, growth rate and feed efficiency according to inherent genetic potentiality of a particular category of animal can be achieved only through accurate evaluation of their nutrient needs. Keeping these in view, the present study was undertaken to determine energy and protein requirements of lactating cattle using the combined nutrient intake and performance.

India has emerged as the largest milk producer in the world, but the productivity of dairy animals is still low. The low milk productivity by Indian cattle and buffaloes has been attributed to several factors. However, inadequate nutrition is the single largest factor responsible for low milk productivity in dairy animals. Several reports indicate that there is deficiency of both green and dry fodder and commercial concentrate in the country due to which animals don't get adequate feed for expression of their genetic potential [Kundu *et al*., 2005] [6]. Efforts to increase the feed and fodder resources during the last four decades have been offset by the increase in the bovine population at an annual rate of 1.5 percent. Therefore, availability of feed fodder to the livestock has remained unchanged during this period further feeds fodder costconstituteabout60-70percent of cost of milk production, thus cultivated fodder has an important role in meeting requirement of the livestock in terms of nutrients and bulk for economic milk production. The green fodders are known to be cheaper source of nutrients as compared to concentrate and hence useful in bringing down the cost of feeding and reduce the need for purchase of concentrate feeds from the market. Moreover, it was observed that energy and protein are the main limiting factors for production of livestock, however, mineral deficiencies may also limit the animal performance [Kabaija and little, 1998] [4]. Therefore, in the present study was planned to see the nutrient requirement of cows and excess or deficit of energy and protein in the diet.

Materials and Methods

The present study was conducted on 20 lactating cows of the second to third lactation were selected individually from villages Baddaua, Semadhana, Baroda, Sallaiyagazi, Hinnpur, Gosra and Kakarkuiya situated as Jaisinagar road of district Sagar, Madhya Pradesh. Cows were divided randomly into 2 dietary treatment of 10 animals each considering their body weight, milk yield, parity and stage of lactation. The experiment was conducted for the period of 180 days.

Dietary Treatment

The 2 dietary treatment used are as under.

Group A (T_1)

The animals of this group were be maintained on strategic supplementation. The diet will be given exactly as per their nutrient requirement.

Group B (T_2)

The animals of this group were be fed similar to diet as group 3 with addition of mineral supplementation.

Statistical analysis

The data obtained were analyzed using general statistics *viz*., computation of percentage, mean, standard deviation and correlation coefficient. Two sample test for mean and proportion on normal distribution and one way ANOVA was used to find significant differences among groups.

Result and Discussion

Feeding practices existing in the dairy farm

In all the lactating cows ad lib feeding of straw was practiced. The preferred straw used for the feeding of animals was wheat straw. Besides wheat straw limited quantity of green Berseem was offered daily to each cow.

DMI for first lactation cows is less than that for mature & adult cows, which must be considered when concentrate is fed independent of forages, especially in component-fed herds.

Data from 24 feeding trials conducted on lactating cattle from different institutes across India were subjected to regression analysis to derive requirements of ME, TDN, CP and DCP for maintenance, milk production and body weight gain. Maintenance requirements for ME, TDN, CP and DCP were 598 KJ, 39.5 g, 6.27 g and 2.90 g/kg, respectively and the corresponding requirements for production of 1 kg 4% FCM were 5,023 KJ, 332 g, 82 g and 58 g. The corresponding requirements for one g gain in BW were 27 KJ, 1.78 g, 0.44 g and 0.19 g.

Regression analysis of conducted feeding trial data provides estimates of nutrient requirements of milk producing animals kept under normal farm feeding condition and hence such approach has been widely used (Abate, 1989; Walter and Mao, 1989; Solis *et al*., 1991; Udeybir and Mandal, 2001; Paul *et al*., 2002; Paul *et al*., 2003) [1, 12, 11, 6, 3]. The data obtained in the study were statistically analyzed and presented.

Feed/Dry Matter intake of the animals

Dry matter intake of the animals was recorded before the start of the experiment. The offered feed ingredients were green Berseem, wheat straw and concentrate mixture. The quantity of each feed ingredients offered to the animals was recorded. It was 5 kg green fodder, 4.34 kg concentrate and the dry fodder mainly wheat straw was provided adlib. The quantity recorded was 6 kg dry fodder. The actual dry matter intake was 5.64 through wheat straw, 0.75 through green Berseem and 3.84 through concentrate mixture. The total dry matter intake in all the animals was 10.23 from all the feed ingredients. While, the quantity consumed as such was 15.34 kg including all the feed ingredients. The data recorded about dry matter intake and nutrient supplied in terms of DCP and TDN is presented in Table.

Table 1: Dry matter, DCP and TDN intake of animals through concentrate and roughage

Ingredients	Quantity (kg)	Dry matter (kg)	DCP (gm)	TDN (kg)
Berseem	5.00	0.75	93.80	0.44
Wheat Straw	6.00	5.64	0.00	2.71
Concentrate	4.34	3.84	489.20	2.44
Total	15.34	10.23	583.00	5.59

Nutrient requirement of the animals

Nutrient requirement of different animals pertaining to different groups was calculated using feeding standards. The maintenance requirement of cows was calculated on the Nutrient requirements of the animals' basis of their body weight. Production requirement was calculated on the basis of their milk yield.

Table 2: Ingredient composition of concentrate mixture (Dairy gold)/ kg

S. No	Ingredients	Quantity
1	Moisture	11%
2	Protein	18%
3	Fat	2.5%
4	Fibre	20%
5	Silica	5%
6	Salt	2%
7	Urea	1%
8	Calcium	0.5%
9	Phosphorus	0.5%
10	Vitamin A	500IU
11	Metabolizable energy	2240 kcal
Calculated		
DCP		12.74%
TDN		63.63%

Table 3: Composition of mineral mixture (Agrimin forte)/ kg used at field

S. No.	Ingredients	Quantity
1	Calcium	25.5%
2	Phosphorus	12.75%
3	Sulphur	0.72%
4	Zinc	9600 mg
5	Sodium	5.9 mg
6	Vitamin A	7 lakh
7	Vitamin D	7500 IU
8	Vitamin E	250 mg
9	Nicotinamide	1000 mg
10	Cobalt	150 mg
11	Copper	120 mg
12	Iodine	325 mg
13	Iron	150 mg
14	Magnesium	600 mg
15	Potassium	100 mg
16	Selenium	10 mg

Table 4: Nutrient requirement of animals of Group A

S. No.	Animal No.	Animal body weight (kg)	Maintenance requirement		Average milk yield (lit.)	Production requirement		Total requirement	
			DCP (gm)	TDN (Kg)		DCP (gm)	TDN (Kg)	DCP (gm)	TDN (Kg)
1	C1	352.9	230	2.7	4.30	193	1.35	423	4.05
2	C2	388.1	230	2.7	5.65	254	1.78	484	4.48
3	C3	352.9	230	2.7	3.65	164	1.15	394	3.85
4	C4	371.3	230	2.7	5.20	234	1.64	464	4.34
5	C5	363.7	230	2.7	6.40	288	2.02	518	4.72
6	C6	355.5	230	2.7	6.22	280	1.96	510	4.66
7	C7	369.5	230	2.7	5.15	231	1.62	461	4.32
8	C8	377.7	230	2.7	4.80	216	1.51	446	4.21
9	C9	373.7	230	2.7	4.25	191	1.34	421	4.04
10	C10	389.0	230	2.7	3.27	147	1.03	377	3.73
Mean		369.43	230	2.7	4.88	219.8	1.54	449.8	4.24
SE		4.21	0	0	0.33	14.81	0.10	14.81	0.10
SD		13.31	0	0	1.03	46.84	0.32	46.84	0.32

Table 5: Nutrient requirement of animals of Group B

S. No.	Animal No.	Animal body weight (kg)	Maintenance requirement		Average milk yield (lit.)	Production requirement		Total requirement	
			DCP (gm)	TDN (Kg)		DCP (gm)	TDN (Kg)	DCP (gm)	TDN (Kg)
1	D1	381.7	230	2.7	5.80	261.00	1.83	491.00	4.53
2	D2	372.4	230	2.7	6.30	283.50	1.98	513.50	4.68
3	D3	339.3	200	2.4	3.85	173.25	1.21	373.25	3.61
4	D4	365.5	230	2.7	3.35	150.75	1.06	380.75	3.76
5	D5	372.2	230	2.7	3.55	159.75	1.12	389.75	3.82
6	D6	349.5	200	2.4	4.80	216.00	1.51	416.00	3.91
7	D7	368.3	230	2.7	6.50	292.50	2.05	522.50	4.75
8	D8	397.2	230	2.7	6.85	308.25	2.16	438.25	4.86
9	D9	357.5`	230	2.7	3.89	175.05	1.23	405.05	3.93
10	D10	355.4	230	2.7	4.80	216.00	1.51	446.00	4.21
Mean		365.9	224	2.64	4.96	223.60	1.56	437.60	4.20
SE		5.24	4.00	0.04	0.41	18.65	0.13	17.35	0.15
SD		16.58	12.64	0.12	1.31	58.96	0.41	54.85	0.46

Strategic, supplementation to the animals

Animals were strategically supplemented exactly as per their nutrient requirement according to their maintenance and their production.

By the strategic supplementation we have reduced the feed supplied to different groups of animals at the farmer's field. In group A there was a reduction of 1.05 Kg of concentrate mixture per animal. While in group B there was reduction of 1.20kg of concentrate mixture per animal. The total concentrate mixture reduced form the group A was 10.50 kg per day. While, that reduced from Group B was 12.00kg per day.

Percent excess and deficit of nutrients supplied to the animals

After calculation the total nutrient offered as well as the total nutrient required by the animals according to their maintenance as well as their production status. The percent excess and deficit of the nutrient were calculated by subtracting the total nutrient offered and total nutrient required by the animals. In group A the percent excess of nutrients in terms of DCP and TDN was 22.85% and 24.15% and in group B the percent excess of nutrients in terms of DCP and TDN was 18.59% and 24.87% These excess nutrients can be minimized to maintain the economics of milk

production and the health status of the animals in the dairy farm. The percent excess and deficit of the nutrients are presented in Table.

Table 6: Percent excess or deficit of energy a protein in the diet of animals of diff GPS

S. No.	Group	Supplied		Required		Excess (+) or Deficit (-)	
		DCP (gm)	TDN (kg)	DCP (gm)	TDN (kg)	Excess/ deficit DCP (%)	Excess/ deficit of TDN (%)
1.	Group A	583.00	5.59	449.80	4.24	+133.20 (22.85%)	+1.35 (24.15)
2.	Group B	583.00	5.59	437.60	4.20	+145.40 (24.94%)	+1.39 (24.87%)
	Mean	583.00	5.59	430.46	4.10	152.54 (26.16%)	1.49 (26.65%)

Strategic supplementation

In the present experiment we found that there was feeding of DCP and TDN to the animals and farmers were not using mineral mixture in the diet of animals which was also reported by Nagalakshmi *et al*. (2006b) [7]. In group A, there was 22.85% DCP and 24.15 TDN. In group B there was 18.59% DCP and 24.87 TDN. Accordingly, in the present study we reduced the excess quantity of DCP and TDN feeding to the animals and supplemented the mineral mixture in group B animals. These results were in agreement with Singh *et al*. (2006) [13]. Similarly, Shahi and Saraswat (1997) [11] also observed 31.25% higher TDN intake in milch cows and buffaloes.

References

1. Abate A. Metabolizable energy requirements for maintenance of Kenyan goats. Small Rumin. Res. 1989;2:299-306.
2. AFRC. Technical committee on responses to nutrients, report number 5. Nutrient Requirements of Ruminant animals. Nutr. Abstr. Rev. (Ser B). 1990;60:729-804.
3. ICAR. Nutrient Requirements of Domestic Animals. Indian Council of Agricultural Research, New Delhi, India, 1998, 11.
4. Kabaija E, DA. Nutrient quality of forages in Ethiopia with particular reference to mineral elements. In proceedings of the 3rd workshop held at the International Conference Centre Arusha, Tanzania. Pastures Network for Eastern and South Africa (Panesa), 1988.
5. Kearl LC. Nutrient Requirements of Ruminant in Developing Countries. International Feed Stuffs Institute. Utah Agriculture Experimental Station Utah State University, Logon, Utah, USA, 1982, 45-58.
6. Kundu SS, Mishra AK, Pathak (Ed). Buffalo production under different climatic conditions. IBDC, Lucknow, U.P. India, 2004.
7. Nagalakshmi D, Narsimha Reddy D, Sudhakar Reddy M, Pavani P. Assessment of feeding Practices and nutritional status of animals in North coastal zone of Andhra Pradesh. In: VIth Biennial Conference of Animal Nutrition Association (15th to Bookman Old Style17th Sep., 2006) Jammu, 2006b, 181.
8. NRC. Nutrient Requirements of Dairy cattle. National Academy of Sciences, National Research Council, Washington, DC, 1989.
9. Paul SS, Mandal AB, Pathak NN. Feeding standards for lactating riverine buffaloes. J Dairy Res. (UK). 2002;69:73-180.
10. Paul SS, Mandal AB, Mandal GP, Kannan A, Pathak NN. Deriving nutrient requirements of growing Indian sheep under tropical condition using performance and intake data emanated from feeding trials conducted in different research institutes. Small Rumin. Res. 2003;50:97-107.
11. Shahi MV, Saraswat BL. Nutritional status of dairy animals in rural area of Siddhrath nagar district of eastern Uttar Pradesh. In: Proc. VIII Animal Nutrition Research work Conference (12th-14th Dec., 1997) Chennai. Africa (ILCA), Addis Abada, 1997.
12. Singh J, Singh B, Wadhwa M, Bakshi MPS. Effect of level of feeding on the performance of crossbred cows during pre-partum and post-partum periods. Asian-Aust. J Anim. Sci. 2003;16:749-1754.
13. Singh SP, Singh D. Effect of feeding balanced ration on milk production of buffaloes in Kanpur Dehat. In: Proc VIth Biennial Conference of Animal Nutrition Association (15th to 17th Sep, 2006) Jammu, 2006.
14. Solis G, Castellanos AF, Rodriguez GF. Determination of nutritional requirement of growing hair sheep. Small Rumin. Res. 1991;4:115-125.
15. Walter JP, Mao IL. Modeling net energy efficiencies as quantitative characteristics in lactating cows. J Dairy Sci. 1989;72:2362-2374.