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Effect of composite feed additive on milk urea concentration and protein degradation *in vivo* in lactating buffaloes

Kiran Attri and Avijit Dey

Abstract
The study was conducted to examine the effect of composite feed additive on milk urea (MU) concentration the lactating buffaloes. A total of 18 Murrah lactating buffaloes (*Bubalus bubalis*) (avg. milk yield 10.83± 1.56 kg) and (avg. live weight, 507.24 ± 44.18 kg; parity, 2-5) at early stage (30 days) of lactation were selected and divided into two groups of 8 animals each using a completely randomized block design. They were allocated into two dietary groups, control and treatment containing basal feed without or with composite feed additives, respectively. Composite feed additive (CFA) was fed @ 2.5% of total dry matter intake in the treatment group along with concentrate mixture. The urea conc. (mg dl^{-1}) in milk of experimental buffaloes at weekly interval was recorded. Initial milk urea (MU) concentration was comparable ($p>0.05$) between the groups. The concentration of MU in weekly milk samples throughout the experiment remained variable among the buffaloes. However, overall mean concentration of MU (mg dl^{-1}) irrespective of periods remained lower ($p = 0.01$) in CFA fed buffaloes in comparison to control. It was concluded that composite feed additive reduces the milk urea concentration and protein degradation in rumen in lactating Murrah buffaloes.

Keywords: Milk urea, composite feed additive, buffaloes

Introduction
India is a vast country and possesses the largest population of livestock in the world with about 57.3% of the world's buffalo population and 14.7% of the cattle population. (Anon., 2013) [1]. Overfeeding and Underfeeding of protein is the major problem in traditional livestock rearing systems due to unavailability of feed and fodder round the year. Presently India is facing a net deficit of 35.65 green fodder, 10.95% of dry roughages and 44% of concentrate feeds. (Anon., 2013) [1]. Hence it become enormously important to monitor the adequate supply of all the nutrients to the animal for better production performance. Urea concentration in milk and blood has been comprehended as a valuable farm managmental tool to monitor the protein and energy feeding efficiency in dairy animals. (Baker *et al*., 1995; Jonker *et al*., 2002) [3, 6]. Milk urea (MU) concentration is of more practicle use because, milk is not only easy to collect, it also avoids stress due to blood collection. A particular level of milk urea (MU) can be due excess rumen degradable protein (RDP) intake with adequate fermentable metabolizable energy (FME) or intake of required RDP with inadequate FME (Whitaker *et al.*, 1995) [10]. Objectives of the current study were to study the effect of composite feed additive on MU concentration in lactating buffaloes.

Material and Methods
Animals and Management
The study was conducted on Lactating Murrah buffaloes maintained at Institute dairy farm, ICAR-Central Research Institute for Research on Buffaloes, Hisar, Haryana, India. Only healthy animals) (avg. milk yield 10.83± 1.56 kg) and (avg. live weight, 507.24 ± 44.18 kg; parity, 2-5) at early stage (30 days) of lactation were selected and divided into two groups. Farm grown green sorghum (about 25 kg) was offered at 11:00 am, after ensuring complete consumption of concentrates. Wheat straw was offered *ad libitum.* Water was freely available.

Collection of Samples
Animals were milked twice a day by full hand milking technique and milk samples (100 ml each) were collected on the test days.

During the study of three months feeding 220 individual milk samples were collected from 18 lactating buffaloes and analysed weekly for milk urea (MU) concentration. Samples were collected from milk weighing bucket after complete milking and through mixing and stored at 4°C until processed and analysed on same day. Milk samples were analysed for urea content using a calorimetric p-dimethylaminobenzaldehyde (DMAB) procedure (Bector *et al*., 1998) [4].

Statistical Analysis

Data obtained were subjected to analysis of variance (ANOVA) using SPSS 17.0 software and treatment means were ranked using Duncan's multiple range tests according to Snedecor and Cochran (1994).The data are expressed as mean ± SD with significance level $p<0.05$.

Results and Discussion

The urea concentration (mg dl^{-1}) in milk of experimental buffaloes at weekly interval is presented in Table 1. Initial milk urea (MU) concentration was comparable ($p>0.05$) between the both groups viz. CON (control) and CFA (treatment).

Table 1: Effect of supplementation of composite feed additive on milk urea (mg/dl) concentration in buffaloes

Week	Treatments		SEM	P value
	CON	CFA		
Initial	35.71±7.81	35.23±4.7	4.35	0.09
1	44.20±6.58	36.22±7.83	5.70	0.09
2	38.55±7.95	28.33±4.21	5.50	0.23
3	37.45±9.61	28.33±4.21	6.03	0.06
4	41.72^{b} ±6.24	31.78^{a} ±4.95	5.28	0.01
5	42.74^{b} ±7.29	29.29^{a} ±7.87	7.13	0.01
6	42.32^{b} ±6.07	32.78^{a} ±6.02	5.39	0.02
7	39.68±7.81	30.50±7.18	6.09	0.06
8	44.51±6.11	37.02±6.21	4.99	0.06
9	40.10±6.67	37.11±4.50	3.99	0.38
10	43.51±5.87	39.09±3.81	3.71	0.15
11	45.21±9.35	39.78±8.22	6.27	0.31
12	43.41±5.28	42.15±4.14	3.23	0.66
Treatment mean ± SD	41.95^{b} ±3.91	34.41^{a} ±3.31	3.71	0.01

^{a,b} mean values with different superscript within a row varies significantly.($p<0.05$).

The concentration of MU in weekly milk samples throughout the experiment remained variable among the buffaloes. However, overall mean concentration of MU (mg dl^{-1}) irrespective of periods remained lower ($p = 0.01$) in CFA fed buffaloes in comparison to control group.

Decrease in milk urea concentration in CFA supplemented buffaloes could be due to reduced protein degradation in the rumen which was supposed to be utilized at latter part of digestive tract. CFA which contain an ideal combination of methane inhibitors, alternate hydrogen sinks and some rumen stimulating agents might have some role in modulation of rumen environment. Roy *et al* (2005) [7] conducted a study to examine the effect of different feeding regimens on milk urea and milk protein concentration in Murrah buffaloes and concluded that feeding of berseem increased milk urea (MU) concentration due to more degradation of protein in rumen. Fig. 1 depicts weekly milk urea concentration in control and treatment group. The mean MU concentration in treatment group is significantly lower than the control group.($p<0.05$). The CFA might have some role in reducing hyper ammonia producing bacteria (HAB) in rumen resulting lowered ammonia production, thereby lowered urea concentration in milk. Dey and Dutta (2015) [5] reported a significant decrease in milk urea concentration on supplementation of condensed tannins through *Ficus infectoria* leaf meal to crossbred cows. However, no significant change in milk urea nitrogen of Holstein cows was observed in the experiment conducted by supplementation with a blend of essential oils, chitosan or monensin (Vendramini *et al*., 2016) [9].

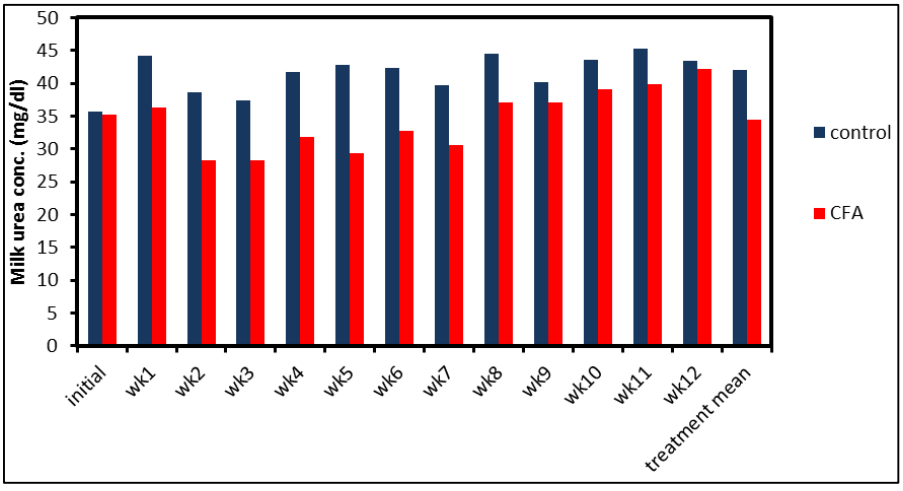

Fig 1: Effect of composite feed additive on milk urea concentration(mg/dl)in buffaloes

Conclusion

Composite feed additive have a positive effect on protein utilization by animals and decreases protein degradation in rumen and concentration of urea in milk when fed @ 2.5% of feed intake in lactating buffaloes. Further long term studies can done to study the effect of CFA on protein utilization in growing animals and heifers.

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