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Effect of stylo meal supplementation in lactating buffaloes: An on-farm trial

G H PAILAN[1], J N GUPTA[2], PURUSHOTTAM SHARMA[3] and S K MAHANTA[4]

Indian Grassland and Fodder Research Institute, Jhansi, Uttar Pradesh 284 003 India

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Supplementation of leaf meal can meet the requirement of livestock particularly during drought periods when availability of other protein rich forages is scarce (Dwivedi and Pathak 2009). Thus it can bridge the gap between the demand and supply of the green fodder and concentrates. Stylo meal prepared from *Stylosanthes hamata* replaced up to 50% of concentrate feed in sheep's diet without any adverse effect on feed intake and nutrient utilization (Mojumdar *et al*. 2004). The feeding of cassava hay in combination with stylo 184 hay as a supplemental protein source was also found potentially valuable strategy in small-holder dairy farming systems in the tropics (Kiyothong and Wanapat 2003). This strategic supplementation significantly reduced concentrate use and resulted in higher economical returns through increased productivity and lower ratios of concentrate to milk yield from 1: 2 to 1: 3 (Kiyothong and Wanapat 2004). Stylo meal at the level of 40–60% could be incorporated in the diet of cattle, goat and deer (Chaisang *et al.* 2004). However, studies on the on-farm trials of stylo meal for lactating buffaloes are almost non-existent. Therefore, this study was conducted to assess the effect of stylo meal supplementation on feed intake and milk yield in lactating buffaloes.

The experiment was conducted from May to June 2004 to record the effect of supplementation of stylo meal on milk yield and its composition in buffaloes at the farmer's field. Lactating buffaloes (10) were selected from 2 farmers for this study. At one farmer's place, 3 lactating buffaloes were fed as per farmer's practice i.e. concentrate mixture 4 kg and wheat straw (control), and for another 3 buffaloes 2 kg of stylo meal was supplemented by replacing 1 kg of concentrate mixture (experimental). Stylo meal was prepared from *Stylosanthes hamata* harvested at 100% flowering stage. The concentrate mixture comprised cotton seed cake 1 kg, mustard cake 1 kg, barley 1 kg and wheat bran 1 kg (CP 21.54%, TDN 75.0%). At second farmer's place, 2 buffaloes were maintained on concentrate mixture (4 kg) and wheat straw, and 2 buffaloes were kept on 3 kg concentrate mixture, and 2 kg stylo meal and wheat straw. The concentrate mixture in case of second farmer comprised cotton seed cake 1 kg, mustard cake 1 kg, gram *chuni* 0.5 kg, barley 0.5 kg and wheat bran 1 kg (CP 22.14%, TDN 74.38%). Concentrate mixture was offered twice a day in equal parts during morning and evening milking. In experimental group 2 kg of stylo meal was offered once in a day during morning while wheat straw was offered *ad lib*. to all the buffaloes. The detail of experimental animals are given in Table 1. Potable drinking water was made available to all the animals twice a day throughout the experiment. The animals were maintained on control and experimental diets for 1 month. The milk yield of all the buffaloes was recorded throughout the experimental period. Towards the end of the experimental feeding period,

Table 1. The details of experimental animals, their dry matter intake, milk yield and its composition

Particulars	Details of experimental animals	
	Control group	Experimental group
Lactation No.	3.4±0.4	3.2±0.5
Heart girth (inch)	77.2±1.2	76.6±2.6
Length (inch)	55.0±1.6	54.8±1.9
Body weight (kg)	497.6±25.5	487.4±30.4
Dry matter intake (DMI) in lactating buffaloes		
DMI through wheat straw (kg)	6.63±0.12	6.09±0.16
DMI through conc. (kg)	3.68	2.76
DMI through stylo meal (kg)	00	1.88
Total DMI (kg)	10.31±0.12	10.37±0.16
DMI (% body weight)	2.09±0.08	2.22±0.10
Milk yield and its composition		
Milk yield (litre/day)	7.80±0.86	8.00±0.95
Total solids (%)	17.40±0.71	16.70±0.60
Fat (%)	7.98±0.59	7.48±0.45
SNF (%)	9.42±0.21	9.22±0.20
Protein (%)	3.29±0.09	3.35±0.08

SNF, Solid-not-fat content.

Present address: [1]Senior Scientist, CIFE, Kolkata Centre, 32 G N Block,Sector V, Salt Lake, Kolkata 700 091, West Bengal (e mail: ghp_par@rediffmail.com).

[2]Principal Scientist, Grassland and Silvopasture Management Division; [3]Senior Scientist, Social Science Division; [4]Senior Scientist, Plant Animal Relationship Division.

Table 2. Chemical composition (% DM basis) of feed ingredients

Feed ingredients	Particulars						
	CP	CF	EE	NFE	Ash	NDF	ADF
Wheat straw	4.09	37.48	1.13	47.23	10.82	73.57	44.52
Stylo meal	11.12	28.62	1.44	52.53	6.47	57.67	39.38
Wheat bran	15.14	12.32	2.78	68.54	3.66	35.41	10.80
Gram chuni	15.71	11.41	4.35	62.95	5.30	37.16	19.47
Mustard cake	34.25	9.08	9.24	38.95	8.64	33.31	18.89
Cottonseed cake	25.90	23.28	7.49	37.60	5.92	51.82	34.30
Barley	10.82	7.31	2.41	75.98	2.55	26.27	14.84

dry matter intake for 7–day period was recorded and milk samples were analyzed for its chemical composition on individual animal basis. The body weight of the animals was calculated by the standard method of measuring heart girth and length of animals using a metric tape (Sastry *et al.* 1991). Samples of individual feed ingredient fed to the animals were analyzed for proximate principals and cell wall constituents (Table 2). The collected samples of feed offered, residues left were analyzed for proximate principles as per AOAC (1995) and fibre components as per Van Soest *et al*. (1991). The feed samples, collected at fortnightly intervals were analyzed for DM to estimate the DM intake. Milk samples were analyzed for total solid, milk fat and protein contents (ISI 1961, 1977). The results of all experimental data were analyzed to test for significance differences between means of variables of experimental animals using the t test (Snedecor and Cochran 1989).

Dry matter intake: The average daily dry matter intake (DMI) in control and experimental groups was 10.31 kg and 10.37 kg, respectively (Table 1). The DMI variation between the groups was nonsignificant. However, supplementation of stylo meal significantly ($P<0.05$) reduced wheat straw intake in experimental animals. On the contrary, supplementation of stylo meal replacing 75% of concentrate mixture reduced DMI by 23.9% in crossbred lactating cows fed wheat straw based diets (Mojumdar *et al.* 2009).

Milk yield: The average milk yield in control and experimental groups was 7.80 and 8.00 litre, respectively (Table 1). Chemical composition (%) of milk, i.e. fat, total solids, solids not-fat and protein contents were similar in both the groups. Similarly, milk yields as well as its composition were comparable in crossbred cows fed wheat straw and stylo meal replacing concentrate mixture (Mojumdar *et al.* 2009). But supplement of *Stylosanthes scabra* leaf meal increased milk production in cows. The complementary ration containing 30% which corresponds to 3 kg of *Stylosanhes scabra* DM led to a greater milk output (1.83 litre/day) followed by the complementary ration containing 20 and 10%, which respectively induced milk production of 1.45 and 1.12 litre of milk per day (Mupenzi *et al*. 2009). Others also reported that strategic supplementation of stylo meal, leucena leaf meal and urea molasses mineral block (UMMB) etc. improved DM intake and milk yield in animals (Prasad *et al*. 2001, Singh and Singh 2003). Sharma *et al*. (2004) also reported similar findings that strategic feeding of 4% urea-treated wheat/rice straw during late gestation to buffaloes had a significantly higher lactation yield compared to control, but there was no difference in milk composition. The DM supply for this group surpassed 5 kg/100 kg of live weight. The results showed an adequate potential for live weight gain, specifically in the dry season (432 g). This was in agreement with the high growth and development of the female cattle in the calf stage (Mejias *et al*. 2001).

Table 3. Economics of feeding stylo meal in buffaloes

Particulars	Control	Experimental
Cost of concentrate (₹/kg)	6.50	6.56
Cost of wheat straw (₹/kg)	1.50	1.50
Cost of stylo (₹/kg)	00	1.00
Intake (kg)		
Concentrate	4.00	3.00
Wheat straw	6.31	5.37
Stylo	00	2.00
Total	10.31	10.37
Cost of ration		
Total (₹)	35.47	29.74
Per litre of milk (₹)	4.55	3.72
Additional cost (₹/litre)	0.83	00
Rate of milk sale (₹/litre)	14.00	14.00
Milk yield (litre)	7.80	8.00
Total price (₹)	109.20	112.00
Marginal returns (₹)	00	2.80

Economics of feeding stylo meal: The replacement of 1 kg concentrate mixture saved ₹ 5.73/day from the ration of a milking buffalo. The per litre cost of milk production was reduced by ₹ 0.83 for experimental buffaloes compared to control. The marginal return was ₹ 2.80/day/buffalo (Table 3). The higher economical returns by strategic supplementation from milch animals have been reported by various other studies. Supplementation of UMMB improved milk yield in lactating buffaloes with enhanced cash benefits of over ₹ 11/day/buffalo under smallholder mixed farming system (Misra *et al*. 2007). Das *et al*. (2001) found that by jack fruit waste supplementation, feed consumption and milk yield did not vary significantly between the groups, however, feed cost per kg milk production reduced by 15% in experimental group. Sharma *et al.* (2004) reported that in the opinion of the participating farmers, strategic feeding of urea-treated wheat/rice straw significantly improved straw consumption, milk yield, body condition of the animals and the level of cash benefits under a subsistence -oriented mixed farming system. Kiyothong and Wanapat (2004) also found higher economical returns through increased productivity and lower ratios of concentrate to milk yield from 1: 2 to 1: 3.

The results suggested that on dry matter basis 25% of concentrate mixture could be replaced by stylo meal without affecting milk yield and its composition in lactating buffaloes under on-farm condition.

SUMMARY

An experiment was conducted to assess the effect of stylo meal supplementation on DM intake and milk yield in lactating buffaloes at the farmer's field. Average daily dry matter intake in control and experimental groups was 10.31 kg and 10.37 kg, respectively. There was nonsignificant variation in the dry matter intake in terms of % body weight (2.09 vs 2.22). Supplementation of stylo meal significantly reduced the wheat straw intake in experimental buffaloes. Average daily milk yield in control and experimental groups was 7.80 and 8.00 litre, respectively. Chemical composition (%) of milk was similar in both the groups. The replacement of 1 kg concentrate mixture reduced the cost of ration by ₹ 5.73/day/buffalo with a marginal return of ₹ 2.80/day/buffalo. It was concluded that on dry matter basis 25% of concentrate mixture could be replaced by stylo meal without affecting milk yield and its composition in lactating buffaloes under on-farm condition.

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