Effect of Supplementation of Bypass Fat on Lactation Performance in Dairy Cows

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ABSTRACT

The present study was undertaken to evaluate the influence of supplementation of bypass fat on lactation performance in crossbred cows. Twelve crossbred lactating Jersey cows were divided into two groups, *viz.,* Group T1 (Control) and T2 (Treatment). Group T1 fed roughages and concentrate mixture as per standard practice followed in the farm, and group T2 received the same ration as group T1 and supplemented with bypass fat @ 30g/100 kg BW. The milk production, 4% FCM yield, milk fat, total solid content and specific gravity of milk were significantly ($P<0.01$) increased in cows in the bypass fat-supplemented group (T2) compared to the control. The bypass fat supplementation @ 30 g/100 kg body weight per day was beneficial and cost-effective in improving milk production and milk composition.

Keywords: Crossbred Cows, Bypass Fat Supplementation, Milk Yield, Fat Percentage

INTRODUCTION

Dietary supplementation of bypass fat in dairy cattle improves milk yield, milk fat content, unsaturated fatty acid content of milk and efficiency of energy utilization. Several workers studied responses to supplementation of bypass fat and reported an increase in milk and FCM yield in lactating buffaloes and milk fat percentage in dairy cows (Sirohi *et al,* 2010). However, very scanty work has been conducted on the effect of bypass fat supplementation on lactation performance in dairy animals. Hence, the present experiment was undertaken to investigate the influence of supplementation of bypass fat on lactation performance in crossbred cows.

MATERIALS AND METHODS

Twelve Jersey cross cows were selected based on their daily milk yield (10-11 kg of milk per day) and lactation number (3rd or 4th), and grouped into T_1 and T_2, with six cows each. Dairy cows in T_1 group received a basal diet (concentrate mixture) prepared at the farm by mixing different raw materials as per the NRC's (2001) standard feeding requirements to meet their maintenance and lactation. The dairy cows in T_2 group were also given the basal diet, along with the bypass fat supplementation at a rate of 30g per 100 kg body weight for 30-35 days. The basal diet was fed at 4.5- 5.0 kg/animal/day, and chopped Guinea grass (*Megathyrsus maximus*) and Lucerne (*Medicago sativa*) were used as green forage in the experiment for both groups.

The prepared concentrate mixture was soaked in water for four to five hours before feeding and fed two times, *i.e.,* at 3.30 AM and 3.30 PM, just before milking. The green roughages (Guinea grass - 14-15 kg/ animal/day and lucerne 15-16 kg/ animal /day) were given to the experimental animals. The roughage to concentrate ratio followed for feeding experimental animals on dry matter basis was 40: 60. The calcium salts of the commercial bypass fat product used in this study were free-flowing powder containing 85% fat and 9% Calcium and sprinkled over the wet concentrate mixture before feeding. Normal standards of hygiene, management, feeding practices, vaccination and deworming

programs were followed throughout the experimental period.

RESULTS AND DISCUSSION

The ingredient composition of the experimental concentrate mixture prepared and used is presented in Table I. The chemical composition of the concentrate mixture, guinea grass and lucerne is presented in Table
II. The effect of bypass supplementation on lactation performances and milk composition is presented in Table III. The findings revealed that there was a significant ($p<0.01$) increase in daily milk production of cows supplemented with bypass compared to the control group. The average daily milk production of cows of the treatment group was significantly ($P<0.01$) higher than that of the control group, which suggested that feeding of bypass fat in lactating cows was beneficial in increasing milk production. Rajesh *et al* (2014) also reported that cows supplemented with prilled bypass fat @ 75 g/day/cow had significantly higher milk yield than crossbred cows of the control group. However, Sontakke *et al* (2014) reported that bypass fat supplementation had not influenced the milk yield, and statistically non-significant results were recorded in crossbred cows. The daily fat-corrected milk (FCM) yield of the cow from the treatment group was significantly ($P<0.01$) higher than that of the control group. The findings of this study were in accordance with Sirohi *et al.* (2010), who reported higher FCM yield in lactating crossbred cows supplemented with bypass fat @ 300 g/day/animal**.** However, Schauf and Clark (1989) reported a statistically nonsignificant effect of bypass fat supplementation on FCM yield in crossbred cows.

The chemical composition of milk analysed in this study revealed a significant ($P<0.01$) increase in milk fat (%), total solids (%), and specific gravity in bypass fat-supplemented group animals (T2) compared to control group (T1) animals. Similar findings were reported by Yadav *et al.* (2015) and Han *et al.* (2011). However, the average milk protein and SNF contents of milk were comparable between the groups and similar observations were also recorded by Rajesh *et al.* (2014).

CONCLUSION

It is concluded that the dairy cows with milk yield of 10-11 litres per day showed an increased milk yield and improved milk composition by supplementation of bypass fat @ 30 g/100 kg body weight per day.

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Table I: Composition of the Concentrate Mixture

Ingredients	Per cent
Maize	30
Cottonseed cake	32
Wheat bran	35
Mineral mixture (containing 23% of Ca, 12% of P, 6.5% of Mg, 0.5% of Fe, 0.025% of I, 0.077 of Mn, 0.012% of Co, 0.38% of Zn, 0.5% of S, 0.07% of Fl and 0.3 (ppm) of Se)	2
Salt	1
Total	100

Table II: Chemical Composition (% DMB) of Concentrate Mixture, Guinea grass and Lucerne

Nutrients	Concentrate	Guinea grass	Lucerne
Dry matter	45.22	24.00	17.00
Organic matter	95.35	90.89	88.50
Crude protein	15.71	8.60	21.50
Ether extract	5.58	1.52	2.05
Crude fibre	12.38	37.00	35.00
Nitrogen Free Extract	61.68	43.77	36.95
Total Ash	4.65	9.11	11.5
Acid-insoluble ash	1.08	3.20	2.40
Calcium	0.85	0.55	2.02
Phosphorus	0.36	0.32	0.30
Mean value of samples	24.286 ±10.27	21.896 ±9.13	21.722 ±8.56

Table III: Effect of Bypass Supplementation on Lactation Performance and Milk Composition

Parameters	T_1 (Control)	T_2 (Bypass fat)	Significance	
Milk yield (kg)	15.11	16.50	**	Significant (P<0.01)
FCM yield (kg)	13.61	15.48	*	Significant (P<0.05)
Milk Composition				
Milk protein, %	3.35	3.36	NS	Non – Significant
Milk fat, %	3.35	3.60	**	Significant (P<0.01)
Milk SNF, %	8.30	8.32	NS	Non – Significant
Total solid, %	11.65	11.92	**	Significant (P<0.01)
Specific gravity	1.028	1.029	**	Significant (P<0.01)

Table IV: Comparison of Income - Profit between Control and Bypass Fat-Supplemented Groups

Parameters	T_1 (Control)	T_2 (Bypass fat)	P value
Average daily milk production (kg/cow)	15.11	16.50	0.578
Total cost of milk production (Rs.35/kg)	11.95	11.88	0.235
Average daily FCM production (kg/cow)	13.61	15.48	0.145
Total cost of FCM production (Rs/kg)	13.26	12.66	0.045
Daily income from milk sale** (Rs)	528.85	577.50	0.003
Daily profit through sale of milk (Rs/ cow)	348.35	381.44	0.435
Profit over control (Rs/cow)	-	348.35*	0.377

Cost of bypass fat (Rs/kg) - 90.00; Profit over control (Rs/cow) = 381.44 -348.35 = 33.09 {(15.11 x 35 = 381.44) – (16.50 x 35 = 348.35)}, Cost of milk /litre– Rs.35; *33.09 {(15.11 x 35 = 381.44) – (16.50 x 35)