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Supplementation of Bypass Fat During Early Lactation in High Yielding Cross Bred Cows Ensures Good Returns

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ABSTRACT

The study was conducted to assess the efficacy of bypass fat supplementation for alleviating energy deficit in high yielding crossbred cows during the early lactation period. Twelve crossbred (Holstein Friesian × Local) cows in early stage of their second and third lactation (10-15 d of calving) with more than 10 l of daily milk production were dewormed and randomly assigned in two groups (Average milk production, 10.15 l and fat percentage 3.3%). The first group of cows (T1) was kept as control and was not supplemented with any energy supplements. The second group of cows (T2) was supplemented with commercial bypass fat at the rate of 10 g/ l of milk produced per day during the initial 90 d of lactation. The final average milk yield of the bypass supplemented cows was 12.32 ± 0.49 which was significantly ($P<0.05$) higher than unsupplemented cows in control group (11.03 ± 0.26). Also, the average milk fat during the study period differed significantly ($P<0.05$) in the bypass supplemented group over the control group. Besides this, supplementation of bypass fat during early lactation ensured good return over feed cost to the farmers.

Key Words: Bypass fat, Milk fat, Milk yield, Return over feed cost.

INTRODUCTION

India has undertaken the crossbreeding policy to increase milk production by increasing the genetic potential of Indian cows for milk yield. The crossbreeding program has certainly resulted in boosting up milk production. However, the milk which is produced possesses less fat percentage due to improper feeding with poor quality roughages. Demand for energy is very high during early stage of lactation but supply does not commensurate with demand, thus affecting the production potential of animal (Sirohi *et al*, 2010). This happens mostly due to lack of proper energy rich diets in the early stage of lactation. The impact of energy is reflected significantly more in lactating and high producing animals, which enter into negative energy balance during early lactation because they cannot consume adequate feed to meet the nutrient requirements for high levels of milk production. Inclusion of unprotected fat in dairy ration is limited to 3 per cent of dry matter (DM) intake, beyond which digestibility of dry mater (DM) and fiber are reduced (NRC, 2001). It has been stated that supplementing ration of lactating animals with bypass fat enhances energy intake in early lactation and reduces the deleterious effect of acute negative energy balance on lactation (Tyagi *et al*, 2010). Supplementation of bypass fat in the diet of dairy animals is very important to alleviate problems of negative energy balance without adversely affecting the dry matter intake and rumen fermentation (Soni *et al*, 2015). Also, its usage during early lactation increases the income of farmers owing to more milk production and fat content. (Rohila *et al*, 2019). The present study was undertaken with the objective of demonstrating the positive effects of bypass fat feeding in early lactating dairy animals.

MATERIALS AND METHODS

The trial was conducted in farmers fields located in Kothamangalam village of Ernakulam district, Kerala for a period of 90 d. Twelve crossbred

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(Holstein Friesian × Local)cows in the early stage of their second and third lactation (10-15 d of calving) with more than 10 l of daily milk production were selected and randomly assigned in two groups. The first group of cows (T1) was kept as control and was not supplemented with any additional energy supplements or bypass fat. The second group of cows (T2) was supplemented with bypass fat at the rate of 10 g / l of milk produced per day during the initial 90 d of lactation. The bypass fat used were rumen inert fats like Ca salts of long-chain fatty acids which resist lipolysis and bio-hydrogenation by rumen microorganisms, but get absorbed from the lower intestine. All the animals were dewormed at the beginning of the trial and ectoparasite infestations were ruled out. Animals were given green fodder (Hybrid napier) @25-30 kg per cow and concentrates mixture with crude protein of 18% and metabolizable energy of 2250 kcal/kg feed to meet their protein and energy requirement for growth as per ICAR standards (Ranjhan, 1998). Concentrate mixture was given according to the level of milk production to meet the maintenance and milk production requirements. Bypass fat was added and mixed in concentrate mixture uniformly and fed. The roughage: concentrate ratio of the diet was kept 60:40. Animals were given ad-lib fresh water throughout the trial. The animals were milked twice a day morning and evening. The concentrate was given at each milking time. Daily milk yield and fat percentage was estimated at fortnightly intervals and average for each group was calculated at the end. The milk was tested with Lactosure milk analyzer at regular intervals and observations recorded. The data obtained in the trial were analyzed statistically by unpaired t test with GraphPad.

RESULTS AND DISCUSSION

Milk Yield

The average milk yield obtained during the 90 d trial was 11.03 l in unsupplemented control (T1) and 12.32 l in bypass fat supplemented group (Table 1). The statistical analysis indicated that the average milk yield of the bypass fat supplemented group (T2) was significantly ($P<0.05$) higher than unsupplemented cows in control (T1) group. This finding was in agreement with the findings of previous workers (Ranaweera *et al*, 2020) who observed that the cows supplemented with bypass fat had recorded significantly higher milk production compared with control during early stages of lactation. Many researchers have reported an increase in milk yield of 5.5-24% during supplementation of bypass fat in feed (Naik *et al*, 2009b; Tyagi *et al*, 2009a; Thakur and Shelke, 2010; Sirohi *et al*, 2010; Parnerkar *et al*, 2011; Wadhwa *et al*, 2012; Gowda *et al*, 2013). The increase in milk yield may be due to the higher energy intake, more efficient use of fat by mammary gland and enhancement of tissue mobilization before peak production (Sklan *et al*, 1991). The addition of fat sources improves the energy status of high-yielding dairy animals and also causes an increase in the energy density of feed. Similar increase in milk yield due to bypass fat supplementation was reported by Garg *et al* (2012) and Mane *et al* (2017). Few researchers have also reported non-significant increase in milk yields due to bypass fat supplementation like Lounglawan *et al* (2008), Soni and Patel (2015) and Veena *et al* (2018) which differs from the finding of the present study.

Milk fat

The average milk fat in the crossbred cows during the trial period was found to be significantly ($P<0.05$) higher in the bypass supplemented group (3.97 %) than the control (3.55 %). Similar increase in milk fat levels were reported by researchers like Garg *et al* (2012) who found an increase of average fat percentage by 0.54 units by supplementing bypass fat @ 100 g/animal. Increase in milk fat percentage was also reported by workers like Soni *et al* (2015), Sharda *et al* (2018), andVeena *et al* (2018). Whereas, few researchers have reported no change in milk fat percentage due to bypass fat supplementation. (Lounglawan *et al*, 2008; Ranaweere *et al*, 2020)

Table 1. Milk yield (l) and milk fat (%) (Mean ± S. E.) measured at fortnightly intervals

Fortnightly intervals of measurement	Milk yield (litre)		Milk fat (%)	
	T1*	T2#	T1*	T2#
At the start of trial	9.92 ± 0.35	10.06 ± 0.27	3.28 ± 0.10	3.32 ± 0.08
2 weeks	10.40 ± 0.33	11.22 ± 0.29	3.46 ± 0.09	3.67 ± 0.10
4 weeks	11.08 ± 0.28	11.97 ± 0.17	3.58 ± 0.09	3.97 ± 0.08
6 weeks	11.71 ± 0.27	13.00 ± 0.14	3.70 ± 0.08	4.22 ± 0.10
8 weeks	11.83 ± 0.31	13.78 ± 0.32	3.66 ± 0.12	4.23 ± 0.10
10 weeks	11.37 ± 0.26	13.25 ± 0.31	3.59 ± 0.11	4.25 ± 0.11
12 weeks	10.92 ± 0.23	12.93 ± 0.30	3.56 ± 0.10	4.12 ± 0.06
Mean	11.03 ± 0.26	12.32 ± 0.49	3.55 ± 0.05	3.97 ± 0.13

*T1 - Control, #T2 - Bypass fat supplemented group

Table 2. Returns over feed cost (in Rs.) due to bypass fat supplementation

Sr. No.	Particular	T1*	T2#
A.	Daily average feeding and maintenance cost (Rs. /cow)		
1.	Cost of green fodder @Rs.2/kg –Total 30 kg	60	60
2.	Cost of concentrate@ 6 kg/cow @ Rs.18/-	108	108
3.	Cost of milking/day (in Rs.)	33	33
4.	Cost of bypass fat supplementation @ 10 g/l of milk-120 g/day (Rs.135/kg)	0	16
	Total (in Rs.)	201	217
B.	Daily Average milk yield (l)	11.03	12.32
C.	Daily average receipt (Rs./cow) @ Rs.34 for Control and Rs.36 for Bypass fat supplemented based on fat in milk	374	443
D.	Daily return over feed cost (Rs./cow) (C-A)	173	226
E.	Daily net return of feed cost over control (Rs.)		53

Economics and return over feed cost

Supplementation of bypass fat during early lactation ensures good return over feed cost to the farmers. Daily net return of feed cost over control per cow showed 31per cent increase in returns in the bypass supplemented group over the control. This was in lines with the returns over feed cost reported by Sharda *et al* (2018) who observed daily net return of feed cost per cow as Rs.28 with increase in returns by 47% in their trial. Similarly, Kumar *et al* (2020) also reported significant increase in income of farmer with bypass fat supplementation during early lactation with a return over feed cost of Rs.33/- over control in bypass fat supplemented group @100 g/animal/day and of Rs.52/- in bypass fat supplemented group @150 g/animal/day.

CONCLUSION

Effective management of energy deficit during early lactation period in high yielding crossbred cows can be done by supplementing bypass fat @10 g/l of milk produced. The significant increase in milk yield and milk fat ensures increased returns to the farmer while alleviating negative energy balance during this period.

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