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Use of Bypass Fat for Augmentation of Production during Transition Period in Cross Bred Cattle

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ABSTRACT

Bypass fat improves the energy balance of cattle during advance pregnancy and early lactation and aids in improvement of milk production and reproduction. The present study was conducted at farmers' dairy farm by KVK Ropar. Twelve cross bred cattle in their late pregnancy (lactation number 2 to 4) and having an average 10-20 l/day peak milk yield were selected for the study. The animals were divided into two treatments groups with six animals in each group. T_1 group was fed without bypass fat according to farmer's feeding schedule and T_2 was fed bypass fat @ 150g/d along with farmer's feeding schedule. Feeding of bypass fat was started 30 d prepartum (expected date of parturition) and continued till 30 d postpartum. Weight of neonates, dam milk production, fat and SNF content were the parameters under study. The results indicated that initial (7-18 d postpartum) and final milk yield (19-30d postpartum) in group T_2 were significantly higher by 11.48% and 17.75% in comparison to T_1 group. The milk fat percent in T_2 was also significantly higher by 8.7% as compared to that in T_1 group. SNF percentage in T_2 group was non significantly higher by 0.4%. Average birth weights of the calves were 25.17±1.94 Kg and 28.67±1.75 kg in T_1 and T_2, respectively. At the end of 30 d trial period body weight of calves improved to 35.67±3.56 and 42.33±2.34 in T_1 and T_2 groups, respectively making it significantly higher by 18.69% in T_2 group ($P<0.05$).

Key Words: Milk yield, bypass fat, transition period, fat, SNF, neonatal weight

INTRODUCTION

The energy requirement of an animal varies with its physiological state. It tends to increase during late pregnancy, parturition and early lactation. Generally, ration of high yielding dairy animals during late pregnancy is energy deficient. The deficiency is further increased by decreased feed intake after calving and higher quantity of milk production. Under field conditions, animals often shed body weight after calving. This leads to delayed conception in animals after calving resulting into longer inter-calving intervals. Therefore, maintenance of energy level during transition phase is of utmost important in dairy farming as lactation length and reproductive efficiency depends on health status during this phase. Such animals produce less milk during this period, thus, decreased lactation yield. At this stage of lactation, farmers usually supplement their animals with some fat source which is rumen degradable fat. But this is not economical and also hampers fibre digestion in the rumen. Bypass fat/ rumen nondegradable fat gets easily digested in lower digestive tract (abomasum, the last/fourth part of stomach) and helps in minimizing the energy deficiency. This in turn supplements the high yielders during advance pregnancy and early lactation and helps in improving milk production and reproduction. Bypass fat should be in the ration of dairy animals during the transition phase (period three weeks before and three to four weeks after parturition) of animal. It can be supplemented in the ration of dairy animals @ 15-20 g/kg milk production or 100 -150 g/animal/day. Keeping in view the importance of bypass fat feeding under field conditions the present study was conducted to demonstrate the effect to farmers.

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Table 1. Composition of ration fed by the farmers.

Ingredient	Composition (%)					
	DM	CP	CF	EE	Ash	NFE
Maize fodder	23.00	7.71	28.30	3.11	9.11	51.77
Concentrate mixture	92.54	18.78	19.02	3.40	8.10	50.88
Wheat straw	95 .00	2.85	35.61	1.01	12.97	47.55

MATERIAL AND METHODS

The frontline demonstration was carried out at farmers' dairy farms of village Shampura in district Ropar. Twelve cross bred cows in their late pregnancy (lactation number 2 to 4) and having an average 10-20 l/day peak milk yield were selected for the study. The animals were divided into two treatments groups with six animals in each group. T_1 group was fed without bypass fat according to farmer's feeding schedule (Adlib maize fodder, wheat straw and 2 Kg concentrate mixture with mineral mixture) and T_2 was fed bypass fat @ 150g/day along with farmer's feeding schedule. Composition of ration fed by the farmers is given in Table 1.

The cows were dried off and were fed 2.0 Kg concentrate mixture twice a day. The bypass fat was procured from GADVASU, Ludhiana. Feeding of bypass fat was started 30 d prepartum (expected date of parturition) and continued till 30 d postpartum.

Recording of observations: Weight of neonates was recorded at 3 intervals; day 1 of age, day 15 and day 30. Milk production and quality data recording was commenced at day 7 post partum. Milk production of individual animals was recorded at farm itself. After thorough mixing of the milk from all animals separately, samples of 100 ml were taken and transferred to sample bottles. The sample bottles were labelled properly. Milk samples were sent to local milk cooperative society and tested for fat and SNF content. The estimation continued for 30 d post partum. Mean values for days 7-18 (Initial milk yield) and days 19-30 (final milk yield) were used for interpretation of results. Milk yield from 7-18 d post partum was referred as initial milk yield and 19-30 d post partum was termed as final milk yield. Comparison of mean initial and final milk production data among T_1 and T_2 groups was used to assess the effect of bypass fat feeding on milk yield. Comparison of mean live weight attained by neonates at three different time intervals, among T_1 and T_2 groups was used to assess the effect of bypass fat feeding on live weight of neonate and live weight attained by them by the age of one month.

The data was subjected to statistical analysis by tools of mean, standard deviation and T-test.

RESULTS AND DISCUSSION

The effect of feeding bypass fat on milk yield and fat and SNF is depicted in Table 2. The results indicated that initial and final milk yield in group T_2 were higher by 11.48 per cent and 17.75 per cent in comparison to T_1 group and both were found significant at 5per cent level of significance. These results were in agreement with Wadhwa *et al* (2012) who reported that supplementation of bypass fat in the diet of dairy animals increased the milk yield by 5.5-24.0 per cent. Kumari *et al* (2018) reported significant increase in milk yield after supplementation of bypass fat in cross bred cattle under field conditions. Increased milk yield observed in bypass fat fed group may be attributed to improved energy density and energy balance of the ration (Shelke and Thakur, 2011) and higher digestibility coefficients of nutrients (Rumne *et al,* 2022).

There was significant improvement in milk fat percent due to feeding of bypass fat. The milk fat percent in T_2 was significantly higher by 8.7per cent

Table 2. Effect of feeding bypass fat on milk yield and composition.

Parameter	T_1	T_2	% Difference	P value
Initial milk yield (L) (7-18 d postpartum)	9.79±1.14	10.92±0.74	+ 11.48	0.035*
Final Milk yield (L) (19-30 d post partum)	11.50±0.45	13.54±0.46	+17.75	0.000*
Milk fat (%)	2.97±0.05	3.23±0.08	+8.70	0.000*
SNF (%)	8.18±0.08	8.22±0.10	+0.40	0.262

*Significant at 5% level of significance

as compared to that in T_1 group (P<0.05). Rohila *et al* (2016) reported similar findings of improvement in milk fat percentage. Soni and Patel (2015) and Sivadasan and Subramannian (2021) recorded significant improvement in milk yield and milk fat content, both, in milk of bypass fed cross bred cattle.

Though non-significant but SNF percentage in T_2 group was also higher by 0.4per cent which was in line with the findings of Rohila *et al* (2016) who reported non-significant improvement in SNF content of milk after feeding of bypass fat.

The carry over effect of supplementation of bypass fat on birth weight of calves is given in Table 3. Average birth weights of the calves were 25.17±1.94 Kg and 28.67±1.75 kg in T_1 and T_2, respectively making it significantly higher by 13.9per cent T_2 group (P<0.05). These findings were in accordance with findings of Tyagi *et al* (2010) who recorded the average birth weights of the calves as 24.94 and 27.95 kg in control and treatment groups, respectively. This carryover effect was more pronounced at the end of 30 d trial period where body weight of calves improved to 35.67±3.56 and 42.33±2.34 making it significantly higher by 18.69per cent in T_2 group (P<0.05).

Drackley (2000) reported that elevated NEFA levels in lactating cattle indicate that dietary energy intake is insufficient for the milk production or fetal growth and that body fat is being broken down to supply the energy deficit which was supported by Kumar *et al* (2018) who reported that NEFA level of the cows those did not receive bypass-fat had exceeded the upper critical limit (0.52 mmol/L). Better performance of animals may also be assumed due to optimization of NEFA levels in animals of treatment group.

CONCLUSION

It may be concluded from this study that feeding of bypass fat improved milk production, fat percent SNF, birthweight and live weight gain of neonatal calf in lactating cross bred cattle. Improvement in energy balance of pregnant and lactating animals through transition period could be the reason behind this improvement. Further field trials on effect of bypass fat feeding on BCS and length of service period may further strengthen the technology dissemination process.

Table 3. Effect of feeding bypass fat on body weight of neonatal calf.

Age of calf	Live body weight (Kg) (N=6)		P value
	T_1	T_2	
Day 1	25.17±1.94	28.67±1.75	0.004*
Day 15	29.17±3.54	35.00±2.10	0.003*
Day 30	35.67±3.56	42.33±2.34	0.002*

*significant at 5% level of significance

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