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Evaluating Effects of Bypass Fat Supplementation on Early Lactation in Murrah Buffaloes

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ABSTRACT

This study conducted at field conditions to evaluate the climate change effect of supplementation in diet of rumen escape fat (bypass fat) of early lactating Murrah buffaloes under National Innovations in Climate Resilient Agriculture (NICRA) project organized by Krishi Vigyan Kendra, Morena (M. P.) in the year 2016-17. The 10 murrah buffaloes were randomly selected into three equal groups namely farmer practice (control), recommended practice (treatment-1) and recommended practice (treatment-2) with regard to evaluate body weight, milk yield and fat percentage. Buffaloes in control group received no supplementation in diet of bypass fat whereas buffaloes selected to treatment-1 group received 100 g supplementation and those in treatment-2 group received daily supplementation of 150 g in diet from 8th day from parturition till end of trial. Body weight, milk yield and milk fat percentage were measured in all 30 buffaloes on 8th day from parturition and then every fortnight till 92 days post parturition. The results indicated that buffaloes in both treated groups that received bypass fat supplementation performed better than control group with regard to average weight gain, milk yield and fat percentage and performance of both treatment groups were comparable in all measured variables. In conclusion, supplementation of 150 g of bypass fat was found to be effective in improving milk yield, milk fat percentage and preventing weight loss during initial 92 days of lactation.

Keywords: Bypass fat, Supplementation, Milk yield, Milk fat, Murrah buffaloes

Energy required to sustain milk production often exceeds energy available from diet in buffaloes during early lactation. Most of the animal keepers feeding on agricultural by-products and low quality crop residues for lactated animals have got inherent low nutritive value and digestibility. The shortage of feed resources coupled with their poor nutritive value is of major concern to low productivity of dairy animals. Highly lactating buffaloes in early lactation do not consume sufficient dry matter to support maximal production of milk (Goff and Horst, 1997). Demand for energy is very high during early stage of lactation but supply is not commensurate with demand due physiological stage or limited intake may affects production potential of animal in the whole lactation length (Sirohi *et al*., 2010). Hence, during early lactation, dairy animals are often forced to draw on body reserves to satisfy energy requirements (negative energy balance); this leads to substantial loss in body weight which resulting in lower yield (Kim *et al*., 1993). Inclusion of unprotected fat in dairy ration is limited to 3% of dry matter (DM) intake, beyond which digestibility of dry mater (DM) and fiber are reduced (NRC, 2001). It is stated that supplementing ration of lactating animals with bypass fat enhances energy intake in early lactation which reduces deleterious effect of acute negative energy balance on lactation (Tyagi *et al*., 2010).

Supplementation of bypass fat not only increases energy intake but also increase unsaturated fatty acid content of buffalo milk and more economic returns to dairy farmers (Parnerker *et al*., 2010). Diets containing supplemental fat often stimulate increased milk production because of increased energy intake, improved efficiency of utilization of energy, or both (Maiga and Schingoethe, 1997). The rumen protected fat as a technology popularly also called

as bypass fat technology protects fat from degradation and bio hydrogenation in rumen and thus could be used to increase energy density of diet (Krishna Mohan and Reddy, 2009). Hence, keeping the fact in mind, the objective of this study was designed to evaluate the effect of rumen escape fat (bypass fat) on productive performance of early lactating Murrah buffaloes under field conditions.

MATERIALS AND METHODS

A field trial was conducted under National Innovations in Climate Resilient Agriculture (NICRA) project organized by Krishi Vigyan Kendra, Morena in the year 2016-17 for the period of 3 months in Jigni village of Morena district of (M.P.). The study was conducted of feeding bypass fat on body weight, milk production and milk fat in early lactating buffaloes.

Maintenance and treatment regime

All the animals were maintained at the livestock owner's farms under field condition. In accordance with their routine feeding and manage mental schedule records were maintained for further use. The basal diet consisted of wheat and Bajra straw along with wheat and Bajra grains. Bypass fat was added and mixed in wheat and Bajra grains uniformly in morning and fed individual to each animals of treatment group. Total 30 Murrah buffaloes were randomly selected and divided into three equal groups namely farmer practice (control), recommended practice (treatment-1) and recommended practice (treatment-2). Buffaloes in control group received no supplementation in diet of bypass fat whereas buffaloes selected to treatment-1 group received 100 g supplementation and those in treatment-2 group received daily supplementation of 150 g in diet from 8th day from parturition till end of trial. Body weight, milk yield and milk fat percentage were measured in all 30 buffaloes on 8th day from parturition and then every fortnight till 92 days post parturition.

Agarwal's Modified Shaeffer's Formula (AMSF) for Indian cattle were used to assess body weight of all animals shortlisted on day 7th of parturition and thirty animals randomly selected to be included in study. Body weight of all 30 animals were measured every fortnight till 92 days post parturition through AMSF which estimate live weight in seers as the quotient obtained while dividing the product of chest girth and length of animal with variable 'Y' where value assigned to it is 9.0 when chest girth is less than 65", 8.5 when girth is between 65-80"and 8.0 when girth is over 80". Body weight estimated at farm level with AMSF in seers were converted into kilograms by adopting conversion i.e. one seer is equal to 0.93kg. Quantity of daily milk production and fat percentage estimated using Garber method were monitored every fortnight till end of trial on 92 day from parturition.

Statistical analysis

All experimental results were expressed in Mean±S.D. Data was subjected to statistical analysis using 'One way Analysis of Variance' or ANOVA and groups were compared with PostHoc Tukey's multiple comparison test. Data was considered as significant at *P<0.05; P<0.01* and *P<0.001*.

RESULTS AND DISCUSSION

Effect on Body Weight

Average body weight of animals as described in Table 1 were recorded as 374.20±20 kg on 7th day in all groups that found to be significantly increased to 395.28±3.78 (P<0.001) and 396.98±3.58 (P<0.001) after treated with low and high bypass fat supplementation respectively (treatment I and treatment II) during trial in last six fortnights. The finding of this particular study is in agreement with the studies reported by Kita *et al*. (2003) and Mathew and Zacharish (2014).

Table 1: Recorded Body weight (Kg) of Murrah buffaloes after before and after fat bypass supplementation

Days	Control	Treatment-I	Treatment-II
7	374.20±1.30	374.20±1.30^{NS}	374.20±1.30^{NS}
22	375.15±1.25	380.16±2.50*	382.05±2.89^{*a}
36	372.55±3.45	384.56±1.90*	386.38±2.00^{*c}
50	374.25±2.50	389.32±2.14***	390.50±2.17^{***c}
64	373.45±2.45	390.75±2.89***	393.45±2.50^{***c}
78	374.35±1.89	394.22±2.00***	395.15±2.10^{***a}
92	373.25±3.20	395.28±3.78***	396.68±3.58^{***a}

*P<0.001; **P<0.01; *P<0.05 Control v/s Treatment; ^{a}P<0.001; ^{b}P<0.01; ^{c}P<0.05 Treatment 1 v/s Treatment 2.

Effect on Milk yield

Bypass fat supplementation in diet of medium and high milk producible lactating animals help to meet their energy requirements that further helps in expression of milk production potential to its fullest (Sirohi *et al*., 2010). Average milk yield of Murrah buffaloes as described in Table 2 showed the improved milk production from 5.5±0.100 l on 7th day of parturition to 8.6±0.250 l (P<0.001) and 9.2±0.170 l (P<0.001) after treated with low and high bypass fat supplementation respectively in trial period that lasted six fortnights. Increase in milk production in all groups might be explained by higher feed intake towards end of trial when transient anorexic phase due to involuting uterus tides over. Findings of present trial are supported by the previous research work of Vahora *et al*. (2013) and Mathew and Zacharish (2014).

Table 2: Milk yield (l) of Murrah buffaloes after before and after fat bypass supplementation

Days		Treatment-I	Treatment-II
7	5.5±0.100	5.5±0.100^{NS}	5.5±0.100^{NS}
22	5.8±0.090	6.0±0.100*	6.3±0.230^{***a}
36	6.2±0.102	6.5±0.150*	6.8±0.290^{***a}
50	6.5±0.090	7.2±0.200***	7.5±0.210^{***a}
64	6.8±0.070	7.8±0.160***	8.4±0.100^{***c}
78	7.0±0.089	8.2±0.178***	8.8±0.126^{***c}
92	7.2±0.100	8.6±0.250***	9.2±0.178^{***c}

*P<0.001; **P<0.01; *P<0.05 Control v/s Treatment; ^{a}P<0.001; ^{b}P<0.01; ^{c}P<0.05 Treatment 1 v/s Treatment 2.

Effect on Fat content

Average fat content (%) in milk of Murrah buffaloes were also measured and tabulated in Table 3. It showed a gradual increment in all groups i.e. from 5.25±0.211 % on 7th day of parturition to 6.80±0.239 % and 7.25±0.241% after giving of treatment I and II respectively in the trial period that lasted six fortnights. Increase in milk fat percentage in both treated groups might be due to higher fat intake resultant from supplementation of bypass fat. Findings of present trial were found to be accordance with previous studies (Vidhate *et al.,* 2006; Barley and Baghel, 2009; Tyagi *et al.,* 2010) that have been resulted significantly higher milk fat percentage in supplemented group then the non-supplemented group. High bypass fat supplementation (treatment I) significantly gave increased milk yield and fat content in comparison to low bypass fat supplemented group (treatment II).

CONCLUSION

Thus, on the basis of results, we can concluded that the bypass fat supplemented buffaloes (supplemented group) showed a significant increment in weight gain, milk yield and fat percentage than non-supplemented group. So, this study will be useful to increase the weight gain, milk yield and fat percentage of early lactating Murrah buffaloes under field conditions and this will provide the maximum benefit to the dairy farmers.

Table 3: Milk fat (%) of Murrah buffaloes after before and after fat bypass supplementation

Days	Control	Treatment-I	Treatment-II
7	5.25±0.211	5.25±0.172^{NS}	5.25±0.083^{NS}
22	5.38±0.283	5.42±0.281**	5.85±0.239^{***c}
36	5.46±0.219	5.80±0.100***	6.25±1.110^{***c}
50	5.55±0.248	5.90±0.321***	6.60±0.299^{***c}
64	5.62±0.255	6.00±0.289***	6.70±0.310^{***c}
78	5.65±0.198	6.50±0.291***	6.90±0.305^{***c}
92	5.68±0.189	6.80±0.239***	7.25±0.241^{***c}

*P<0.001; **P<0.01; *P<0.05 Control v/s Treatment; ^{a}P<0.001; ^{b}P<0.01; ^{c}P<0.05 Treatment 1 v/s Treatment 2.

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