



Original Research

Lactation Response of Indigenous Lactating Cattle Fed on Mustard Oil and Molasses Supplementation

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Abstract

Eighteen lactating indigenous cattle were randomly divided into 3 groups of 6 animals (3 Gir and 3 Sahiwal) each on the basis of milk yield and lactation stage to study the effect of mustard oil and molasses supplementation on production performance. Cows were fed wheat straw, concentrate mixture and green fodder in the control group and additional 200 g of mustard oil and molasses was given in treatment groups. Experimental feeding was continued up to 90 days after 2 weeks of adaptation. Supplementation of mustard oil and molasses were accompanied by a significant increase in the average daily milk yield as compared to control group. There was no significant difference between supplementation of mustard oil and molasses on average daily milk yield. Supplementation of mustard oil and molasses has no effect on milk fat, protein, lactose and total solids. Highest fat, protein, lactose and total solids (%) were observed in mustard oil supplemented group as compare to control and molasses supplemented group. Milk production efficiency in term of predicted lactation milk yield (305 days) based on 90 days and peak yield was significantly higher in mustard oil and molasses supplemented group in comparison to the control group. It was concluded that energy source in the form of mustard oil and molasses supplementation @ 200 g / day / in each animal significantly increased the milk production and efficiency over the control group.

Key words: Indigenous Lactating Cattle, Lactation Response, Mustard Oil, Molasses Supplementation

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Introduction

The technology of supplementation of bypass fat and energy protects the nutrient from degradation and biohydrogenation in rumen with increase in the energy density of the diet enabling the animals to meet their energy and essential fatty acid requirements expressing their milk production potential to the fullest extent (Krishna Mohan and Reddy, 2009). Additional feeding of fat and energy source does not interfere with rumen fermentation process, but supplies more energy to the animal for more milk synthesis after being



digested in abomasum and small intestine with absorption from the small intestine. This helps in increasing unsaturated fatty acid in milk which can produce safer milk for human consumption especially for heart patients (Garg *et al.*, 2008). The present study was done to evaluate feeding of mustard oil and molasses fat and energy source respectively on milk production performance indigenous lactating dairy cows and compared their performance with normal ration.

Materials and Methods

Proposed work was conducted at Livestock farm, Adhartal, College of Veterinary Science & Animal Husbandry, Nanaji Deshmukh Veterinary Science University, Jabalpur (M.P.) Eighteen early indigenous lactating cattle (9 Sahiwal and 9 Gir) of approximately same age, lactation number (1st to 3rd lactation), lactation stage, body weight and milk yield were used for the present study. Selected animals were randomly divided into 3 groups of 6 animals (3 Gir and 3 Sahiwal) each as control (G1), supplemented group with mustard oil (G2) and supplemented group with molasses (G3). The study was conducted during the months of October to January 2016 for 90 days after the adaptation period of 2 weeks. Three experimental basal diet viz containing no added energy (control), molasses @ 200 ml/adult animal/day and Mustard oil @ 200 ml/adult animal/day were formulated and fed as total mixed ration according to nutrient requirement of lactating dairy animals (NRC, 2001).

Experimental animals were stall fed and managed in intensive system of housing. All The experimental animals were fed according to their body weight and production (NRC, 2001). The water was kept available to animals round the clock. All the animals were offered identical ration consisting of green fodders, wheat straw and concentrate. The chaffed green fodder *ad libitum* (berseem / sorghum / maize), and wheat straw @ 4 kg per day were offered and concentrate, consisting of 16% crude protein plus 68% total digestible nutrients were offered at a scale of 1 kg per 2.5 kg milk production along with maintenance ration @ 2 kg per day. Measured quantity of mustard oil and molasses was mixed daily in concentrate in the morning at the time of feeding and fed individually to each experimental animal. The animals were hand milked twice a day in the morning (6.00 am) and evening (5.30 pm) and milk yield (MY) was recorded individually daily throughout the experimental periods. Milk samples from each animal in all the groups were collected and analysed at fortnight intervals for milk composition by auto analyzer (Ultrasonic auto milk analyzer, Netco Pvt. Ltd.). Predicted lactation yield (305 days) were calculated by using ratio estimates of partial lactation of cattle (Thomas and Sastry, 2012). The lactation yield up to 12 weeks was multiplied by the corresponding ratio estimates of 2.8096 to obtain estimates of lactation yield. Persistency of milk production calculated as follows:

$$\text{Persistency \%} = (\text{Milk kg at later test} / \text{Milk kg at earlier test}) \times 100$$

Statistical Analysis

The data were analyzed statistically using standard methods (Snedecor and Cochran, 1994) for one way analysis of variance (ANOVA) using general linear model of SPSS version 12 and Duncan's multiple range tests was applied to test the significance. Significance was declared when P value is less than 0.05.

Result and Discussion

Milk Production

Productive performance in lactating indigenous cattle supplemented with molasses and mustard oil are presented in Table 1.

Table 1: Productive performance in lactating indigenous cattle supplemented with molasses and mustard oil.

Groups	Average Daily Milk yield (lit.)	Fat %	Solid Not Fat (%)	Protein %	Lactose %	Total Solids %
I	4.92 ^a ±0.51	3.31 ±0.09	8.73 ±0.06	3.51 ±0.03	4.38 ±0.05	12.01 ±0.11
II	5.92 ^b ±0.51	3.58 ±0.95	8.98 ±0.64	3.63 ±0.04	4.54 ±0.05	12.56 ±0.13
III	5.23 ^b ±0.56	3.53 ±0.05	8.88 ±0.08	3.58 ±0.03	4.43 ±0.04	12.41 ±0.08

Group I: Control; Group II: Mustard oil supplemented group; Group III: Molasses supplemented group
Means bearing different superscripts (a, b) within a column differ significantly ($P < 0.05$).

There was significant increase ($P < 0.05$) in the average daily milk yield in the animals supplemented with mustard oil and molasses as compare to control group. However, there was no significant difference between the group supplemented with mustard oil and molasses on milk yield. Highest average daily milk yield was recorded for the mustard oil supplementation group followed by molasses supplemented and control group. Increase in milk yield in treatment groups over control group might be due to the higher energy intake and more efficient use of oil and molasses (Bernal-Santos *et al.*, 2003) and that also minimized the adverse effect of post partum negative energy balance. (Gowda *et al.*, 2013).

Similar findings of increase in milk yield by supplementation of oil/fat and molasses in the form of energy source were reported by Shelke *et al.* (2012) in Murrah buffaloes (*Bubalus bubalis*), Gowda *et al.* (2013) and Mathew *et al.* (2014) in crossbred cows. However, Savsani *et al.* (2015) reported that there was no significant effect of feeding of energy source on milk yield in Jaffrabadi buffaloes. Significant increase in milk yield indicate that medium and high producing lactating cattle need the energy supplementation to meet their energy requirements fully to express their milk production potential.

Milk Composition

There was no significant increase in milk fat, protein, lactose and total solids in the milk of the animals supplemented with mustard oil and molasses as compared to control group. Highest milk fat % was recorded for the mustard oil supplementation group followed by molasses supplemented and control group.

Increase in the milk fat in animal fed mustard oil and molasses may be due to exogenous supply of mustard oil and were directly incorporated in to the milk fat. Similar findings were reported by Sirohi *et al.* (2010) lactating crossbred cattle, Masahito (2011) in dairy cows, Garg *et al.* (2012) in crossbred cows, Shelke *et al.* (2012) in Murrah buffaloes (*Bubalus bubalis*), Savsani *et al.* (2015) in Jaffrabadi buffaloes.

However, George *et al.* (2014) in crossbred dairy cows reported there was no significant effect of feeding of energy supplement during on milk composition. No effect on milk protein was probably due to decreased in plasma fatty acids may be responsible for decrease in milk protein by decreasing concentration of circulating growth hormone or dietary fat might have imparted amino acid transport. insufficient critical amino acids needed for milk protein synthesis with increase in milk yield (Nawaz *et al.*, 2008) and Whitlock *et al.* (2006) suggested that decreased in plasma fatty acids may be responsible for decrease in milk protein by decreasing concentration of circulating growth hormone or dietary fat might have imparted amino acid transport.

Milk Yield Traits

Effect of different treatments on milk yield traits in indigenous lactating cattle are presented in Table 2.

Table 2: Effect of different treatments on milk yield traits in indigenous lactating cattle

Groups	Peak yield	Days to Attain Peak MY	Predicted Lactation MY (305 days)	Persistency (%)
I	6.35 ^a ±0.74	54.50 ^a ±2.34	1088.46 ^a ±11.01	72.72
II	8.50 ^b ±1.11	38.36 ^b ±2.11	1157.30 ^b ±12.24	88.23
III	7.20 ^b ±1.20	43.40 ^b ±2.73	1143.874 ^b ±11.39	79.94

*mean with different superscript within column differ significantly ($P < 0.05$)

The result of the study indicated that predicted lactation milk (305 days) based on 90 days lactation yield was significantly ($P < 0.05$) higher in supplemented group with mustard oil and the lowest in control group. The highest average peak yield and persistency of milk production was recorded in supplemented group with mustard oil followed by in supplemented group with molasses and control group respectively. The supplemented group with mustard oil animals attained their peak yield earlier as compared to supplemented group with molasses and control group. Similar finding were reported by Bhat (2000) and Singh *et al.* (2003) in crossbred cows.

Several studies have revealed diets containing supplemental fat often stimulate increased milk production because of in-creased energy intake, improved efficiency of utilization of energy, or both and lowers stress during early lactation which support higher milk production (Maiga and Schingoethe, 1997, Sampelayo *et al.*, 2004 and Boken *et al.*, 2005). Similar finding was also reported by Shelke and Thakur (2011) in buffaloes supplemented with bypass nutrients.

Conclusion

It is concluded that feeding of mustard oil and molasses resulted in increase in average daily milk yield, peak milk yield and predicted lactation yield and persistency of milk production in treatment group as compared to control group. The other milk components like fat, protein, lactose and solid not fat did not affected among the treatment groups. Feeding of mustard oil resulted in a higher net profit based on feeding cost per day due to higher milk production suggesting that this technology can be used for efficient milk production.

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