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Milk Yield, Feed Intake and Weight Gain of Cross Bred Lactating Dairy Cattle Fed Concentrate Ration with Varying Levels of Molasses

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ABSTRACT

The aim of this experiment was to evaluate the inclusion level of molasses in the concentrate feed for cross bred lactating dairy cattle. Nine crossbred cows of second and third lactation were randomly assigned to three dietary treatments: control (no molasses), 10% and 20% molasses. Total duration of experiment was seven weeks. Mean daily milk yield was higher in the cows fed 20% molasses feed ($p<0.05$) compared to the control and 10% treatment animals. Highest milk yield 8.71 kg/day was recorded for cows fed 20% Molasses; whereas, the control group (0% molasses) produced the least yield 6.22 kg/day. Similarly, daily feed intake was higher ($p<0.05$) in the cows fed 20% molasses than those fed no and 10% molasses in their diets. Highest daily feed intake 80.4 kg reported in the 20% molasses treatment than the control group with lowest intake of 71.1 kg/day. The live body weight gain was not affected by dietary treatment ($p>0.05$). Economically ration having 20% Molasses had the lowest cost of milk production (Rs: 15.8 /kg) as compared to ration having 10% (Rs.19.01/kg) and control (Rs.22.07/kg). It is concluded that inclusion of molasses in the concentrate feed up to 20% in the concentrate feed improved milk yield and feed intake and lowered the cost of feeding in the cross bred lactating dairy cattle.

Key words: *Molasses, Milk Yield, Feed intake, Live Weight and Crossbred Cattle.*

INTRODUCTION

Milk is the main product of livestock farming. Pakistan is the third largest milk producer number in global ranking (International Dairy Federation, 2008). The national cattle herds include a variety of purebred animals such as Sahiwal, Red Sindhi, Tharparker as well as a large number of crossbred animals. However, inadequate feeding has resulted in low milk yield compared to production of animals in developed countries. Additionally, the harsh climatic conditions have been found to negatively affect the production of animals. The adverse seasonal, nutritional and health conditions expose the pure bred cattle to stress in the province, leading to further decrease in animal productivity.

Unavailability of quality feed stuffs and current increase in the ingredients cost is has resulted in reduced profitability and low productivity, consequently affecting the health, milk, and reproduction of dairy cattle. To improve milk production, the farmer needs to optimize the efficiency of utilization of the available feed resources. Thus supplementation with protein and energy source is recommended to overcome the deficient nutrients. Molasses is a by-product of sugar cane processing industry containing carbohydrates, amino acids, peptides and essential minerals (Nisa et al., 2004). A major constraint of livestock production in developing countries is the scarcity and fluctuating quantity and quality of the year-round feed supply. Providing adequate good quality feed to livestock will continue to be a major challenge for agricultural scientists and policy makers all over the world especially in developing countries. The increase in population and rapid growth in world economies has lead to an enormous increase in demand for animal products, a large part of which will be from developing countries. Increased dietary energy through molasses supplementation has been found to improve feed efficiency in adult ruminants (Brown et al., 1962; Morales et al., 1989), suggesting the importance of supplemented energy source in the diets. The supplementation of fermentable carbohydrates can enhance the ruminal functions (Sarwar et al., 2004).

Ruminants are mostly fed on low quality roughages, which are poor in protein, energy, minerals and vitamin contents. The ruminants can make efficient use of mill by-products, crop residues and other non-conventional feed sources. Keeping in view the nutritional importance of the molasses, the current experiment was designed to evaluate the effect of molasses supplementation on milk yield, feed intake and weight gain of crossbred cattle.

MATERIALS AND METHODS

Experimental Animals:

Nine, non-pregnant (open), lactating cross bred cows was selected on the basis of nearly the same lactation stage, age and live weight. The experimental animals were divided into 3 groups A, B and C, and were fed individually on wheat straw as a basal diet along with specially formulated concentrate ration: A (control with

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0% molasses), B and C with 10% and 20% molasses in the concentrate, respectively (Table 1). Fifteen day adaptation period was given, during which the experimental feed was gradually increased and the usual feed was decreased until the cattle were shifted completely to the experimental rations. Adaptation was followed by 49 days experimental period.

Milk yield, Feed intake and Body Weight Measurement:

Experimental animals were hand milked twice daily in the morning and evening at about 11.00 am and 9.00 pm, respectively. Milk yield was recorded daily in the morning and evening on daily basis. Feed offered and refusal was recorded daily and composited for analysis. All the experimental lactating animals were weighed empty stomach at the start of the experiment. Thereafter, body weights were recorded on fortnightly basis.

Statistical Analysis of Data:

The statistical program SPS (version 20; SPS GmbH, SPS Inc., Munich, Germany) was used for data analysis. The data was analyzed using ANOVA technique and presented as Mean ± SE. Results were declared significant at $p<0.05$.

Table 1. Composition of different experimental ration

Ingredient	(Control) Molasses 0%	(B) Molasses 10%	(C) Molasses 20%
Cotton seed cake	20	20	20
Mustard seed cake	20	20	20
Maize oil cake	10	10	10
Wheat bran	10	10	10
(20%) corn gluten	6	6	6
(30%) corn gluten	6	6	6
Molasses	-	10	20
Wheat grain	10	6	3
Salt Powder	1	1	1
D.C.P	1	1	1
Rice Polish	16	10	3
Chemical composition			
Crude protein (%)	16.7	16.2	15.6
ME (M. Cal/kg)	2.89	3.0	3.2

RESULTS & DISCUSSION

Significant changes in milk yield of crossbred dairy cattle fed with ration containing varying levels of molasses (Table 2). Mean value revealed that highest milk yield (8.70 ±0.52 kg/day) was recorded for group C whereas minimum milk yield (6.22 ± 0.52 kg/day) was recorded for Control group. Our results are in line with the observations documented by Yan et al. (2010), who documented that milk yield increased when animals were fed on ration having high level of molasses at 25% of DM. In another experiment, Murphy (1999) reported a linear increase in milk yield with high level of molasses in the diet (351g/kg molasses on a dry matter basis, 150M). The increase in milk yield of dairy cow fed with high level of molasses in concentrate supplement might be related to the rapidly rumen fermentable energy in the form of molasses. This finding is in line with the result of (Murphy, 1999), who fed different level of molasses in silage based diet and reported that milk production linearly increased with increase level of molasses in the feed.

Similarly, Van soest et al. (1991) fed urea molasses block to Holstein cross bred and Sahiwal crossbred cattle and concluded that the average milk yields was higher in the cattle fed urea molasses blocks than control group suggesting the impact of feeding molasses on milk yield. On the contrary, work by Lofgreen and Otagaki (1960) reported that diets that constitute more than 10% molasses decreased the milk yield. Whereas, others reported that the inclusion of molasses up to 31% in total DM of the complete diet of grass silage plus concentrate improved milk yield as well as milk protein concentration (Murphy, 1999; Yan et al., 1997). The increase in milk yield of cattle fed with high molasses diet might be due to the fact that molasses feeds the rumen microbes resulting in proper utilization of fiber leading to high concentration of volatile fatty acid essential for milk production. Molasses nourishes rumen microflora, improves rumen fermentation and hence cellulose degradation resulting in high concentration of volatile fatty acids such as propionic acid which is required for milk synthesis (Sarwar et al., 2004) as source of energy. Similarly high level of molasses increases

daily milk production of lactating dairy cattle's (Ngongoni et al., 2006; Sarwar et al., 2004).

Results of molasses supplementation are given in Table 3. Mean value showed that maximum total mix ration (TMR) intake (80.405kg/day) was recorded for group fed on ration having Molasses 20%, while minimum (71.105kg/day) was recorded for control group.

Results of intake suggest that there is a linear increase in the intake with increasing molasses level in the ration. The increase in feed intake might be related to higher palatability of diet due to inclusion of molasses, and might be due to the fact that molasses feed the rumen bugs which result in higher degradation of fibrous diet. Our result are in line with the finding of (Chaudhary et al., 2001), who reported that the addition of molasses might have improved the palatability of ration. Molasses addition at 20% of the DM has been found to improve the utilization of crop residues based ration in ruminants (Preston and Leng, 1986). Similar finding has been observed by Yan et al. (2010), who fed diets containing molasses at 125, 250 and 375 g/kg DM, and reported an increase in total DM intake with the increasing level of molasses in the diet (Preston, 1986). Montgomery and Baumgardt (1965) also documented that addition of small quantities of molasses to dried milled hay improved voluntary feed intake.

Mean change in live BW of crossbred dairy cows are presented in Table 4. Average initial live weight of the control, B and C fed ration having zero%, 10% and 20% molasses were 320.0 kg, 346.3kg and 338.3kg respectively, whereas the final BW recorded were 331.7 kg, 346.7 kg and 345.0 kg, respectively. Mean changes in live weight during 45 day experimental period for group control, B and C was 11.7, 0.33 and 6.67 kg, respectively. All treatment groups showed a trend in weight gain. Substitution of molasses at different levels did not affect live weight during entire experimental period. Earlier studies illustrated that supplementation of low quality forages with molasses based mixture increased animal weight gain in free grazing cattle and buffalo calves. Supplementation of low quality crop residues with fermentable carbohydrates improved animal growth performance (Brown, 1993). Our findings are in agreement with that of Bond and Rumsey (1973), who reported that that supplementation of fermentable carbohydrates increased the intake of diet resulting in greater weight gain. The supplementation of diets with fermentable energy not only improved feed intake but could also enhance nutrient digestibility (Sarwar et al., 2004). Tahir et al. (2012) reported that diets supplemented with molasses enhanced nutrient digestibility in buffaloes.

Table 2. Effect of feeding varying levels of molasses in concentrate ration on daily milk yield (Kg) of cross bred cattle

Ration type	Mean ± S.E	P-value
Control (0%Molasses)	6.22 ± 0.52	
B (10% Molasses)	7.23 ±0.52	0.001
C (20% Molasses)	8.70 ±0.52	

Table 3. Effect of feeding varying levels of molasses in concentrate ration on daily feed intake (Kg) of cross bred cattle

Ration type	Mean ± S.E	P-value
0%Molasses	71.11 ± 1.63104	
10% Molasses	75.0947 ±1.63104	0.000
20% Molasses	80.4053 ±1.63104	

Table 4. Mean changes in Live Body weight of Dairy cattle fed concentrate ration having varying levels of molasses

Ration type	Initial BW (Kg)	Final BW (Kg)	Change in BW (kg)	P-Value
0%Molasses	320.0	331.7	11.7 ±3.88	
10% Molasses	346.3	346.7	0.33 ±3.88	0.0651
20% Molasses	338.3	345.0	6.7 0 ±3.88	

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