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Effect of grooming and bathing on milk yield and milk composition in crossbred cows during summer season

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Abstract

The experiment was carried out on 20 healthy crossbred cows divided in four groups of 5 animals each based on nearly similar age and lactation period. Four groups of grooming and bathing were adopted in the study *litz* control, groomed and bathed once, groomed twice and bathed once, and groomed and bathed twice a day. All cows were kept under same feeding schedule for 10 days under preliminary period to adapt the test diet followed by 60 days experimental period for records. The data were analyzed statistically. The results of study were revealed that the mean of Milk yield, Milk fat percent, Total solid and solid not fat were significantly ($P<0.05$) higher in group T₃ followed by groups T₂, T₁ and T₀, however the mean of specific gravity and acidity percent in milk were no significant difference in among groups. Therefore adoption of two times bathing and grooming in cross-bred cows under hot conditions may be used by dairy farmers as effective routine managerial practices to obtain higher milk yield and its compositional quality as well as reduce heat stress during summer season.

Keywords: Crossbred cows, Grooming and Bathing, Milk composition, Milk yield

Introduction

Dairying is acknowledged as the major instrument in bringing about socio-economic transformation of rural people in India (Patel, 2013) [11]. Milk is one of the oldest nearly perfect foods known to man and it is the physiological lacteal secretion obtained from complete milking of apparently healthy dairy animals' udders. The composition of milk and its quality are important for the dairy industry and human health because milk composition is related to the milk processing ability whereas quality concern is the need of time. Milk fat is the main milk ingredient considered important for payment but now the payment criteria in India and worldwide also, includes per cent protein, total solids, total microorganism count and somatic cell count in per ml milk along with compulsory determination of freshness.

With the efforts of farmers, technical experts, scientists and visionaries, milk production in India had reached to a commendable level of 155.5 million tons and Per capita per day availability of milk in India has also increased to 337 g milk (NDDDB, 2015-16) [10].

Milk occupies a unique position among foods because of complete food for infants, good supplementary food for people of all ages and invalids. Milk proteins are animal proteins in a vegetarian diet. Milk proteins and peptides have several therapeutic and prophylactic properties which protect against gastrointestinal disorders, hypertension and enteric infection. Milk is a rich source of all vitamins especially riboflavin and vitamin V₁₂. Milk is also richest natural source of calcium in the best available form. Milk contains several extra nutritional constituents such as conjugated linoleic acid, spingomylines, butyric acid, myristic acid and β-carotene which protect against cancer, cardiovascular disease, enteric infection, diabetes, besides having immune-modulatory and sliming effect. Mother's milk contains large amount of several antimicrobial substance such as immunoglobines, lactoferrin, lysozyme, lactoperoxidase and vitamin B₁₂ that fight against enteric infection. Milk contains serum cholesterol lowering factors. There is no scientific base for implicating milk in cardiovascular disease, diabetes, cancer etc. All concerns are unfounded (Kansal, 2004). Dairy management is responsible for producing more milk and getting safe milk from dairy animals and it is also the ultimate purpose of dairy farming. Producing quality milk on a dairy farm is important to increase keeping quality of milk and to make good quality dairy products. Important and economical dairy farm practices that should be exercised as the routine managerial practices for dairy animals are bathing along with grooming. In India, farmers usually avoid grooming which is the simple but effective way of increasing milk yield and its compositional quality. Major benefits of bathing and grooming are to keep the animals clean and fresh with better blood circulation which in turn reduce the stress due to environmental pressures,

improving physiological conditions and ultimately support towards hygienic production of milk as well as to increase milk yield. Bathing and grooming also help to remove dirt, stains, stuck ecto- parasites, tangled body hairs, giving luster to the skin and increasing blood circulation beneath the skin. Most importantly these practices reduce the bacterial count in the milk arising from the udder region which contaminates the milk during milking and directly influence the overall quality of milk and thus help to secure the better place in dairy market. Therefore bathing and grooming are good routine practices meant for dairy animals on daily basis which improve animals' aesthetic as well as physiological conditions of body hence in turn support to increase milk yield and its overall quality. Keeping this in view, the present experiment has been designed to study the effect of different combinations of bathing and grooming on milk yield and compositional quality of raw milk in cross-bred cows.

Method and Materials

Experimental design

The experiment was carried out on twenty healthy crossbred cows (n=20) nearly similar age and in late stage lactation to study the effect of grooming and bathing on milk yield and milk composition. Four groups of grooming and bathing were adopted in the study viz control (T₁), groomed and bathed once (T₂), groomed twice and bathed once (T₃), and groomed and bathed twice (T₄) a day. The animals were fed basal rations as per requirements (ICAR, 2013). All cows were kept under same feeding schedule for 10 days under preliminary period to adapt the test diet followed by 60 days experimental period for records.

Feeding and management of animals

The experimental animals were kept in separate pens throughout the study. The concentrate mixture and wheat straw (Table 1) were offered in the morning and evening. Cows were fed individually to meet the requirements (Kearl, L.C., 1982) on respective diets.

Feed sample analysis

The chemical composition of samples (Dry Matter, Crude Protein, Crude Fibre, Ether Extract, Nitrogen Free Extract and Total Ash) was determined by the methods described by Association of Official Analytical Chemists (AOAC, 2000) [1].

Table 1: Feed ingredients and chemical composition used in the experimental ration.

Ingredients	Proportion (in parts)	
	Concentrate	Wheat Straw
Pigeon pea bran (Arhar bran)	27	
Wheat bran	70	
Mineral	2	
Salts	1	
Total	100	100
Chemical composition		
Dry matter (%)	88.50±0.60	89.50±0.21
Crude Protein (%)	11.89±0.14	3.10±0.07
Ether extract (%)	3.12±0.07	1.09±0.02
Crude Fibre (%)	15.89±0.15	38.98±0.19
Nitrogen Free Extract (%)	63.06±0.68	46.70±0.52
Total Ash (%)	6.04±0.45	9.93±0.58
*TDN (%)	69.41±0.84	47.72±0.59

*Total Digestible Nutrient calculated by NRC, 1989.

Milk sample analysis

Daily milk production of each cow was recorded and weighed by digital weighing balance. Milk samples, consisted of proportional volumes of morning and evening milk, were taken after cleaning and disinfection of teats and discarding the first streams of foremilk. Milk samples were collected in 100 ml sterile plastic vials at last 11 consecutive days of experiment during the lactation period. Specific gravity was determined in milk samples by using Lactometer according to Murphy, J.J. (1999) [9], Total solids was done by Badcock's formula according to Prasad *et al.*, (1999) [12], Fat percent was determined in milk samples by using Gerber's fat test according to BIS., (1977) [2], Solid not fat was determined in milk samples according to Prasad *et al.*, (1999) [12] and Milk yield of cows was recorded daily in morning at 4.00 to 5.00 am and evening at 3.00 to 4.00 pm.

Statistical analysis

The data on milk yield and its composition were analyzed statistically using one way ANOVA technique as per Snedecor and Cochran, (1994) [13]. Means were separated for significance by using Tukey Kramer range test.

Result and Discussion

Dietary chemical composition

The chemical composition of wheat straw and concentrate is presented in Table I. Dry matter (DM %) content of wheat straw and concentrate mixture was 89.50 and 88.50 %, respectively. Crude Protein (CP) and Total Digestible Nutrients (TDN) content of wheat straw and concentrate mixture were 3.10 %, 11.89 % and 47.72 %, 69.41%, respectively.

Milk yield and Milk Composition

The average milk yield (kg) of cows per day was significantly ($P<0.05$) higher in T₃ (7.539) followed by T₂ (6.796), T₁ (4.308), and T₀ (3.923), respectively. The different combinations of bathing and grooming were found significant effect to increase milk yield of cross-bred cows. Results of per day milk yield of the present study are in line with the observation of Mishra (2012) [8]. The mean of fat per cent in milk of cross-bred cows was recorded significantly ($P<0.05$) higher in T₃ (4.244) followed by T₂ (4.138), T₁ (4.004) and T₀ (3.818). The different combinations of bathing and grooming were effective for increasing the fat per cent in milk of cross-bred cows. It is important to note that significantly highest fat per cent in milk was found in cows of control (T₀) group which have shown significantly lowest per day milk yield. However differences between the values of T₃ and T₂, T₂ and T₁ and also between T₁ and T₀ were found non-significant being at par. The results of present study are in line with the observations of Change and Kim (1978). The SNF per cent in milk was recorded in T₃ (10.398) followed by T₂ (10.284), T₁ (10.078) and T₀ (9.772). Differences in these values were found significant ($P<0.05$) except between T₃ and T₂ being at par. From the perusal of data the combinations of bathing and grooming were significantly effective for increasing of SNF per cent in milk of cross-bred cows. Results of SNF per cent in milk of the present study are in the line with the observations of Jacob *et al.*, (2014) [5]. The Total solid per cent in milk was recorded in T₃ (14.642) followed by T₂ (14.422), T₁ (14.082) and T₀ (13.59). Differences in these values were found significant ($P<0.05$) except between T₃ and T₂ being at par. From the perusal of data the combinations of bathing and grooming were significantly effective for

increasing of Total solid per cent in milk of cross-bred cows. Results of Total solid per cent in milk of the present study are in the line with the observations of Jacob *et al.*, (2014) [5]. The average acidity per cent in raw milk was found non-significant but numerically higher in T₃ (0.145) followed by T₂ (0.144), T₁ (0.141) and T₀ (0.131), respectively. The different combinations of bathing and grooming were not significant effect in acidity per cent. The results on the present study are in line with the observations of Change and Kim

(1978). The mean of specific gravity in milk was found non-significant but minor differences in T₃ (1.032) followed by T₂ (1.031), T₁ (1.030) and T₀ (1.028), respectively. The different treatments of bathing and grooming combinations were no significant effect in specific gravity of milk. Result of the present study for specific gravity of milk is in line with the findings of Mishra (2012) [8]. The all data on milk were showed in table 2.

Table 2: Milk yield and compositional quality of crossbred cows under different combinations of bathing and grooming during summer season.

Attributes	T ₃	T ₂	T ₁	T ₀	Results
Milk yield (Kg) per day	7.539 ^a	6.796 ^b	4.308 ^c	3.923 ^{cd}	S
Fat (%)	4.244 ^a	4.138 ^{ab}	4.004 ^{bc}	3.818 ^c	S
SNF (%)	10.398 ^a	10.284 ^a	10.078 ^b	9.772 ^c	S
Total solid (%)	14.642 ^a	14.422 ^a	14.082 ^b	13.59 ^c	S
Acidity (%)	0.145	0.144	0.141	0.132	NS
Specific gravity	1.028	1.030	1.0306	1.032	NS

*Means with different superscripts (a, b, c) in row differ significantly ($P < 0.05$)

Conclusion

It was concluded that the adoption of two times bathing and grooming in cross-bred cows under hot conditions may be used by dairy farmers as effective routine managemental practices to obtain higher milk yield and its compositional quality as well as reduce heat stress during summer season.

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