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EFFECT OF DIETARY NUTRIENT AND ANIMAL SPECIES ON MILK PRODUCTS

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ABSTRACT

An experiment was conducted at L.R.C., S.V.P.U.A. & T., Meerut on six Sahiwal cows and six Murrah buffaloes, three animals of each species were given control diet and three were given experimental diet to study the effect of diet and species on daily milk yield, paneer yield and ghee yield in factorial experiment. The average daily milk yield (kg), paneer and ghee (g) per kg of milk along with cv in percent in Sahiwal cows and Murrah buffaloes under control diet and experiment diet were found to be as 4.28(11.72), 5.14(9.76), 5.19(9.76) and 5.42(9.26) kg milk, 178(13.99), 209(35.69), 239(31.25) and 270(27.67) g paneer and 40(13.32), 46.67(11.42), 69(7.72) and 75(7.10) g ghee, respectively. The factorial effect of diet and species were found on daily milk yield 45 ± 0.40 and 0.591 ± 0.40 kg, on paneer yield 31.17 ± 4.98 and 60.83 ± 4.98 (g) per kg of milk and on ghee yield 6.33 ± 0.14 and 28.67 ± 0.14 (g) per kg of milk, respectively. The analysis of variance showed that in all the production traits except daily milk yield the difference between control diet and experimental diet and between Sahiwal cows and murrah buffaloes were found to be highly significant.

Key words **:** *Nutrients, species, sahiwal cow, murrah buffalo, milk products*

India continues to be the largest producer of milk in world. Several measures have been initiated by the Government to increase the productivity of livestock, which has resulted in increasing the milk production significantly to the level of 100.9 million tonnes at the end of the Tenth Plan (2006-07) as compared to 53.9 million tonnes in 1990-91. The estimate of the milk production for 2009-10, 2011-12 and 2012-13 was 112.5, 127.9 and 133.7 million tonnes respectively. National Dairy Development Board's (NDDB) Annual Report for 2010-11 has conveyed that India continued to be the largest milk producing nation in 2010-11. The country's estimated milk production for 2010-11 was 121 million tonnes, close to 17 percent of world milk production. It is estimated that about 5 percent of total milk produced in India is converted into paneer (1). Paneer is used primarily for the preparation of a number of culinary dishes (2). In the recent year there has been much emphasis on the development of protein rich food. Paneer is in white appearance with sponge body close knit texture and possessing sweetish acidic nutty flavour (3). Paneer is an important acid coagulated milk product prepared by addition of permitted organic acid to milk at higher temperature and is widely used for culinary purposes in the northern and western part of India (4). Though originally it was localized in North western part of India but now it has travelled almost all part of the country. Paneer provides easy means of conserving and preserving valuable milk solid during the flush season or in high milk producing areas and transporting it to the regions where either milk production is scanty or the terrain is hard for easy transportation of milk (5). Buffalo milk is preferred over cow milk for the production of paneer because it provides better body and texture as well as higher yield and higher recovery of all the nutrients and greater nutritive value. It is evident from the studies that the whole buffalo milk is not suitable for the manufacture of paneer due to its high fat content. It has been reported that desirable body and texture in paneer is not obtained if it is prepared from milk rich in fat.

India produces about 8,00,000 tonnes of ghee annually, much of it by the traditional method of heating butter at a temperature of 110°C or a little higher until it contains less than 1% moisture, and the milk solids separate out and turn brown. The milk solids are separated by straining and discarded. The clear fat that remains is ghee. The impact of various dietary fats on risk for atherosclerosis has been studied extensively during the last 4 decades, using serum lipoproteins as biochemical markers, which has led to several meta-analyses. But these studies have almost entirely based on dietary fats commonly used in western countries.

Dietary factors can greatly affect the composition of milk composition of milk and nutrition offers the most effective means of rapidly altering the composition of milk. Among milk components (fat, protein, lactose, minerals, and vitamins), fat and protein are the two

most subjected to changes due to dietary manipulation and consequently change the quantity of milk products. Paneer is highly nutritious as it contains concentrated form of almost all the proteins and fat along with essentials minerals and vitamins of milk. It retains about 90% fat and protein, 50 % minerals and 10 % lactose of the original milk (Rao et al., 1992). Buffalo milk paneer also had a higher NPU (80.10) as compared to cow milk paneer (78.28) and mixed milk paneer (77.17). This showed the superiority of buffalo milk over cow milk from nutritional point of view.

MATERIALS AND METHODS

In the present investigation a total of six Sahiwal cows and six Murrah buffaloes were selected from Livestock Research Centre of the S.V.P. University of Agriculture and Technology, Meerut. Three cows and three buffalos were kept as control supplying feed as other animals of LRC, Three cows and three buffalos were feed with experimental diet. These cows were maintained under proper management conditions in well ventilated sheds. The cows and buffalos were stall fed and fodders were provided at 8:00 A.M. and 4:00 P.M. The cows and buffaloes were milked twice per day by hand method at 5:00 A.M. and 5:00 P.M. Before milking udder was washed by warm water and dried with clean cloth. During the experimental period all the animals were confined to shed and were taken out for water 3 to 4 times daily to an adjacent tank. In the first step of the experiment, three cows and three buffaloes were selected and fed with experimental diet as 2.0 Kg ration (wheat daliya 35%, rice polish 20%, cotton seed cake 20%, mustard oil cake 15%, molasses 7%, mineral mixture 2%, Common salt 1%) per animal per day for 30 days.

Preparation of Paneer : The paneer is an acid coagulated indigenous milk product. For making paneer, the fresh milk was filtered though double layered muslin cloth to remove dust and dirt particles and all other foreign material and then it is heated up to 85±1°C and 2 % citric acid was added slowly to the milk with continuous stirring till a completes coagulation occurred and transparent whey came out (4).

Ghee Preparation : Ghee is a milk product obtained by slow heating of the butter up to 115°C temperature. For ghee preparation, first of all cream was separated by usual procedure and heated up to 40°C. After that the starter was provided to get the better flavour and aroma and then cultured butter was churned to separate the butter milk and butter. Ghee made from butter has less moisture then ghee made from cream (6). Observations on milk yield and milk products were found with normal distribution so subjected as such to the analysis to study the main effect of animal species and dietary nutrients on milk yield and milk products by using with two levels of each two factors with factorial experiments according to (7).

RESULTS AND DISCUSSION

Average milk yield (Kg/day) of Sahiwal cows and Murrah buffaloes : The mean and coefficients of variation for milk yield in Sahiwal cows and Murrah buffaloes under control diet and experimental diet were found to be 4.28, 5.14, 5.19 and 5.42 kg per day, respectively. The coefficient of variation for milk yield in Sahiwal cows and Murrah buffaloes for control diet and experimental diet ranged from 9.26 to 11.72 %. The highest coefficient of variation was observed for Sahiwal cows under control diet and the lowest coefficient of variation was observed for Murrah buffaloes under experimental diet. The analysis of variation (Table-1) showed that the feeding experimental diet, species and interaction effect on average milk yield in Sahiwal cows and Murrah buffaloes was observed to be non significant (p=0.05%). Average milk yield (Kg/per day) in Sahiwal cows and Murrah buffaloes under control and experimental diet found non-significantly different (p=0.05%). The same findings were as observed by (8).

Table-1: Average milk yield (Kg/day) of Sahiwal cow and Murrah buffaloes.

Replication	Sahiwal cow		Murrah buffalo		Total
	Control Diet	Treatment Diet	Control Diet	Treatment Diet	
1.	3.79	4.61	4.97	5.00	18.37
2.	4.06	5.00	5.41	5.26	19.73
3.	5.00	5.82	5.19	6.00	22.01

Average milk Paneer yield (gm/Kg of milk) in Sahiwal cows and Murrah buffaloes : The mean paneer yield in Sahiwal cows and Murrah buffaloes under control diet were found to be as 178 and 239 gm per Kg of milk and under experimental diet were found to be as 209 and 270 gm/ Kg of milk in Sahiwal cows and Murrah buffaloes respectively (Table-2). The coefficient of variation for paneer yield in Sahiwal cows and Murrah buffaloes for control diet were found to be 13.99 and 31.25 and for experimental diet 31.25 and 27.67 % respectively. The highest variability for paneer yield was observed in Sahiwal cows fed experimental

Table-2: Average paneer yield (gm/kg of milk) of Sahiwal cow and Murrah buffaloes.

Replication	Sahiwal cow		Murrah buffalo		Total
	Control Diet	Treatment Diet	Control Diet	Treatment Diet	
1.	180	211	241	272	904
2.	178	210	239	270	898
3.	176	207	237	268	888

diet and lowest also in Sahiwal cows under control diet. The diet rich in protein and fat due to increased proportion of the cotton seed oil cake resulted into an increase in milk protein, milk fat, total solids and SNF and consequently resulted into an increased yield of Paneer. The similar findings were also observed by (8).

Average Ghee yield (gms) per kg of milk in Sahiwal cows and Murrah buffaloes : The mean ghee yield in Sahiwal cows and Murrah buffaloes under control diet were found to be as 40 and 69 gm per Kg of milk respectively (Table-3). The mean Ghee yield in Sahiwal cows and Murrah buffaloes fed with experimental diet were found to be as 46.67 and 75 gm per Kg of milk respectively. The ghee is a milk product contained milk fat and therefore, if milk fat in milk increases due to feeding and different species, consequently the ghee yield would also increase. (6), also reported that feeding fresh grass and increase proportion of rich energy source in diet increases the ghee production.

Table-3: Average Ghee yield (gm/kg of milk) of Sahiwal cow and Murrah buffaloes.

Replication	Sahiwal cow		Murrah buffalo		Total
	Control Diet	Treatment Diet	Control Diet	Treatment Diet	
1.	42	46	71	77	238
2.	40	52	69	75	236
3.	38	42	67	73	220

CONCLUSSION

Feed management is one of the principal aspect by which the production and composition of milk by dairy cows con be modulated in the short term (9). Introduced nutrition often a mean of making rapid change in milk production and milk composition that leads to changes in the yield of milk products, but the relationship between feed constitutions and milk composition is complex. The greatest change can be brought about in concentration on of milk fat. Particularly important dietary factors are the amount of roughage, forage-concentrate ratio, carbohydrate composition of the concentrate, lipids, intake and frequency. Dietary protein has small effects on milk yield, milk fat and protein concentration. Their experimental possibilities require repeatable response and accurate prediction of overall animal performance. Whatever the technical developments, economic traits will be the final determination of the uptake of each techniques by the dairy farmers.

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