Effect of Order of Milking On Milk Yield and Composition of Raw Milk

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Abstract: The present study was undertaken to determine the Effect of order of milking on milk yield and composition of milk on milk yield, fat, protein, lactose, acidity and sp. gr., for compositional quality of raw milk as influenced by order of milking of healthy twelve cross-bred cows under full hand diagonal method of milking at SHIATS dairy farm, Allahabad. The statistical analysis showed order of milking have significant effect on milk yield of cows but no significant effect on compositional quality of milk at 5 % level of significance. The best order of milking recommended for obtaining higher milk yield from cows was to start milking of hind left and hind right quarters of udder of cow.
Keywords: Cow, Milk yield, Milk composition, Fat, Protein.

INTRODUCTION

Livestock production an integral part of Indian agriculture production system, is destined to play a more significant role in Indian economy. In India hitherto there was a synergy balance maintained between agriculture and animal husbandry, one complementing the order. Thrust on commercialization and globalization are likely to disturb this balance. There is paradigm shift in demand for livestock products like milk, meant, eggs and chicken promoting their increased production. Most of the increase in livestock production has been achieved due to horizontal growth of livestock population rather than by increase in per unit production. This has been so because the livestock rearing and production is largely in the hands of resource poor farmers in rural areas who can not afford to adopt capital intensive technologies of livestock rearing [1]. Dairying in India by and large is in the hands of small/marginal land holders and agriculture labourers. The national average landholding is 1.68 hectares per farm family. Cattle and/or buffalo is a part of families in India. Milk is a clean lacteal secretion obtained by the complete milking of healthy milch animals, properly fed and kept, excluding that obtained with in 15 days before and 5 days after calving. From nutrition point of view Milk is the most nearly perfect food to us. The body needs more than thirty distinct materials in food. No single food stuff in nature supplies all but milk supplies nearly all the nutrients. Milk occupies a unique position among foods, being complete food for infants, good supplementary food for people of all ages and essential protective food for sick and invalids. Milk proteins are highly nutritious that effectively supplements poor quality vegetable proteins in a mixed diet% milk proteins and peptides have several therapeutic and prophylactic properties and protect against gastrointestinal disorders, hypertension and enteric infection. Milk is a rich source of all vitamins especially vitamin A, riboflavin and vitamin B. Milk is a richest natural source of calcium in the best available form. Milk contains several extra nutritional constituents such as conjugated linoleic acid spingomy lines, butyric acid, mysristic acid and B-carotenes, which protect against cancer, cardiovascular disease enteric infection and diabetes, besides having immunomodulatory and slimming effect. Mothers milk contains large amount of several antimicrobial substances such as immunoglobins, lactoferrin lysozyme lactoperoxidase and vitamin B_{12} binding protein that protects infants against enteric infection. Milk contains serum cholesterol lowering factors. Lactic acid produced from milk sugar (lactose). There is no scientific base for implicating milk in cardio-vascular disease, diabetes, cancer etc., all such is concerns are unfounded [2].

MATERIAL AND METHODS

The present experiment was conducted to study the "Effect of order of Milking on Milk Yield and composition of raw Milk" in milking cows of SHIATS Allahabad Dairy farm. Cows in herd were subjected to Californian Mastitis Test (CMT) and only healthy cows free from any noticeable injury on the udder showing negative CMT were selected in the experiment. Samples were collected from the milking pail after milking of cows. Once in the morning at 4:30 AM and second time at 2 PM separately in sterile 250 ml conical flasks and immediately plugged aseptically with cotton plugs. Then samples were brought to laboratory for determination of chemical constituents of raw milk.

Following was the order of milking the cows considered as treatments (T):

T₁ = Milking fore left and fore right quarters of the udder (FL)

T₂ = Milking fore left and hind left quarters of the udder (FR)

T₃ = Milking fore right and hind right quarters of the udder (HL)

T₄ = Milking hind left and hind right quarters of the udder (HR)

T₅ = Milking fore left – hind right quarters of the udder (FL – HR)

T₆ = Milking fore right – hind left quarters of the udder (FR – HL)

Twelve healthy crossbred cows (Jersey-Sindhi Crosses) from of the SHIATS Dairy farm showing negative CMT were selected and housed in one tail to tail barn under similar management conditions. 200 ml milk sample from each cow was collected directly into sterilized conical flask of 250 ml. capacity and plugs replaced immediately. The samples were used for chemical quality to determining Fat, lactose, protein, sp. gr. and acidity percentage in milk. Milk samples were analyzed to determine chemical parameters as per method of AOAC [3]. Fat percent, Protein percent, Lactose percent, Acidity percent and Specific gravity (sp. gr.). The Lactometer was used for rapid determination of specific gravity of Murthy analyzed to determine influence of metabolic size on different chemical parameters of raw milk [4]. The data on compositional ingredients were tabulated and subjected to analysis of variance techniques (ANOVA) as per randomized block design (RBD) of Snedecar and Cochran to determine influence of metabolic size on different chemical parameters of raw milk [5].

RESULT AND DISCUSSION

Means of milk yield and composition at order of milking crossbred cows (Jersey-Sindhi Crosses) are presented in Table 1. While the Mean milk yield (kg) per day was recorded as 5.60, 5.42, 5.75, 7.95, 6.94 and 6.78 kg, in raw milk of crossbred cows in T₁, T₂, T₃, T₄, T₅ and T₆ order of milking. The differences in these were significant. The reason for the decreased milk yield during estrus could be the increase in estrogen levels both in milk and blood and this re-duction might be caused also by a decrease in feed intake. These results are in accordance with previous studies indicating a negative relationship between estrogen concentrations in milk and blood and milk yield [6]. Because decreased time spent feeding has resulted in decreased milk yield in cows in estrus [6]. There was no significant difference (P>0.05) in pH, acidity, dry matter, density, fat and milk lactose content between estrus and post estrus period. On the other hand density, acidity and dry matter of milk decreased during post estrus period when compared to estrus period. While mean lactose level during the estrus was 4.75 %, it was 4.65 % during post estrus period. Sekerden et al. [7]. found that lactose rate in evening milked Jersey cows with different lactation numbers decreased at the estrus period but there was no change in the amount of other milk components. On the other hand other studies indicate that milk fat increased dry matter in milk has a tendency to decrease during estrus period. In Table 1, phenotypic correlation coefficients between pH, acidity, dry matter, fat, lactose and density values of milk in estrus period are presented. In this period, significant phenotypic correlation coefficients (P<0.05), were determined between acidity-dry matter (r = 0.570) and dry matter-fat (r = 0.673). In others words, a positive correlation was determined between acidity and dry matter, and dry matter and fat values of milk in estrus period. Positive correlation between dry matter-fat may be related to the lower milk production during period compared to post estrus period. In Table 3, phenotypic correlation coefficients between pH, acidity, dry matter, fat, lactose and density values of milk in after estrus period are presented. Significant correlation coefficients are determined between lactose-pH (r = -0.755); dry matter-density (r = 0.718) and acidity-fat (r = 0.503) levels of milk. From these characteristics a high negative relationship between lactose-pH, a positive correlation between dry matter-density and between acidity-fat were determined.

Table 1 Means of milk yield and composition at order of milking crossbred cows (Jersey-Sindhi Crosses)

Parameters	Treatment wise Mean values of different parameters in milk					
	T₁	T₂	T₃	T₄	T₅	T₆
Milk yield (kg/day/cow)	5.60ᵃ	5.42ᵃ	5.75ᵃ	7.95ᶜ	6.94ᵇ	6.78ᵇ
Fat %	4.08	4.28	4.18	4.37	4.53	4.43
protein %	3.33	3.36	3.47	3.40	3.51	3.53
Lactose %	4.70	4.74	4.59	4.67	4.72	4.64
Ash %	0.66	0.65	0.65	0.66	0.66	0.66
S.N.F. %	8.68	8.75	8.71	8.73	8.89	8.83
T.S. %	12.76	13.03	12.89	13.09	13.42	13.26
Water %	87.24	86.97	87.11	86.91	86.58	86.74
Acidity %	0.140	0.142	0.143	0.143	0.145	0.151
Sp. gr.	1.0315	1.0278	1.0465	1.0261	1.0292	1.0664

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