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Effect of stage of lactation on physio-chemical quality of cow and buffalo milk

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Abstract

Milk samples on effect of stage of lactation on physio-chemical quality of cow and buffalo milk were collected from individual animal maintained by different village farmers of nearer villages of R.B.S. College, Bichpuri, Agra and analysed. We find that stage of lactation have insignificant effect on physical quality of cow and buffalo milk. In case of chemical quality, the acidity as well as lactose content were also not affected by stage of lactation in both milch animals. The specific gravity of cow milk was significantly (þ ≤ 0.01) poor than buffalo milk in late stage of lactation but stage of lactation have insignificant effect. The results further revealed that the fat, lactose, protein, ash, T.S and SNF content were significantly (þ ≤ 0.01) poor in cow milk than buffalo milk. It was also observed from the study that the effect of stage of lactation on these elements were significant (þd" 0.01) in both milch animals milk.

Key words : Buffalo, cow, fat, lactose, Protein, sp.gr; S.N.F.

Introduction

India is the country of largest holding of the bovine population being about one third of the world population. This is led India to have the distinction of being the largest milk producer in the world, despite very low productivity per animal.

Lactation period of a dairy animals is a process in which a dairy cow starts giving milk after calving and till the last milking. The whole period in which a dairy animal produced milk is called lactation period. Lactation period may be different in different animals as like cow, buffalo, Goat, sheep and other milch animals.

The composition of milk varies due to a large number of factors such as individuality of the animals, breed variation, seasonal changes, age and health of animal, managerial practices including nature and quality of feed, stage of lactation, part of udder of animal and different stage of milking. The composition of milk is not same in the whole period of lactation, its change. Fat percentage in milk decrease slightly during the early lactation and then increase as total production decrease with advancing lactation. Milk protein content gradually increases slightly during advancing lactation. Most of the increase in SNF components of milk is associated with advancing stage of concurrent pregnancy rather than stage of lactation and at parturition milk production commences at a relatively high rate and the amount secreted continues to increase about 3 to 6 weeks. Higher producing cows usually take longer lactation period than low producing cows to achieve peak production. After the peak is attained, milk production gradually declines. The rate of decline is referred to as persistency. Chemical quality of milk for different constituents which it contains is indicative of the nutritional value of the milk. The assessment of quality milk provides a basis of determining its richness, healthfulness and other usefulness which are of utmost significance from the consumer's view point, who want to get the excellent response of what they pay for the purchase of the milk.

The present study was therefore, undertaken to assess the level of distribution of some components viz: Fat, Protein, Lactose, Ash, T.S., SNF etc in the milk of cows and buffaloes having different stage of lactation as early, middle and late.

Methods and Material

The milk samples for assessing the level and distribution of moisture, fat protein, lactose, ash, T.S, etc were collected from the morning milking of milch animals pertaining to two category of ruminents viz.

cows and buffaloes according to three stage of lactation : 1. Early (upto 3 months) 2. Middle (4 to 6 months) and 3. late (after 6 months). Five samples each of cow and buffalo milk in different stage of lactation were collected from individual animal maintained different village farmer of nearer villages of R.B.S. College, Bichpuri, i.e. Bichpuri, chohatna, Sadarwan and Nagla Pati Ram.

The milk samples after collection were transferred to the laboratory and analysed immediately or in special circumstance store in refrigerator upto 2 or 3 hours only analytical procedure. The milk samples which were collected from different stage of lactation of different ruminants were analyzed for different components of milk as physical quality of milk was determined by a panel of judges drawn from the department of A.H. & Dairying, R.B.S. College, Bichpuri, Agra and chemical quality as acidity according to method recommended by IS: 1965-67, specific gravity by lactometer method, Fat by the usual garber's method, protein according to Kjeldahl method (A.O.A.C 1965), lactose by Iodometric method as recommended by knowles and watking. The total solids was determined by standard analytical method and solids not fat (SNF) by difference.

Results and Discussion

The study was carried out on "Effect of stage of lactation on Physico-chemical quality of cow and buffalo milk", in the department of A.H. & Dairying, R.B.S. College, Bichpuri, Agra. The milk collected from cows have light yellow colour due to presence of pigment, carotene. But the milk collected from buffalo have white colour. The flavours of all milk samples have pleasent and the viscosity of cow milk was light thin to visocows than buffalo milk. The effect of stage of lactation on physical quality was not observed in both ruminants.

The chemical quality of cow and buffalo milk of different stage of lactation was presented in Table 1. The Table 1 revealed that the acidity of cow and buffalo milk in early, middle and late lactation was 0.13±0.001 and 0.12±0.001, 0.12±0.001 and 0.11 ±0.001 and 0.12±0.002 and 0.11±0.001 percent, respectively. Our analysis revealed that the acidity percent was not differ in cow and buffalo milk and not affected by stage of lactation in both ruminants. The effect of stage of lactation on specific gravity of cow and buffalo milk was also insignificant, but the specific gravity in late lactation was significantly greater in buffalo milk than cow milk. The fat percentage in cow and buffalo milk in early, middle and late lactations was found to be 4.10±0.27 and 6.12±0.46, 4.50±0.34 and 6.82±0.48 and 5.45±0.51 and 8.00±0.051, respectively. The study show that the fat content in cow milk was significantly ($þ \leq 0.01$) poor than buffalo milk. The effect of stage of lactation was also observed significantly in both ruminants at 1 percent of level of significance. The fat percent was significantly increase with increase in stage of lactation. The lactose percent in milk from cows and buffaloes of different stage of lactation was maximum in first stage of lactation which was 4.70±0.31 in cow milk and 4.74±0.46 in buffalo milk. The lactose content of milk of both ruminants' was differing insignificantly. The effect of stage of lactation was also insignificant in both milch animals. The protein content of milk obtain from cows and buffaloes have different stage of lactation was highest in last stage of lactation in both ruminants'. The protein content was poor in cow milk than buffalo milk. The effect of stage of lactation was also significant ($þ \leq 0.01$) in both milch animals. The protein content was increase with advancing stage of lactation.

The ash percentage in both ruminants' milk was highest in late stage of lactation. It was slightly poor in cow milk than buffalo milk. The stage of lactation show significant ($þ \leq 0.01$) effect on it. The ash content was increase with increase in stage of lactation. The total solids of milk from different lactation stage of cow and buffalo was maximum in late stage of lactation in both milch animals (14.54±1.24 and 17.36±1.11, respectively). The T.S percent was significantly ($þ \leq 0.01$) poor in cow milk than buffalo milk in all stage of lactation. The effect of stage of lactation was also observed significantly ($þ \leq 0.01$) in both milch animals. The T.S. content was increase with increase stage of lactation. The S.N.F. content of milk obtained from cow and buffalo was highest in late stage of lactation. It was significantly poor in cow milk than buffalo milk in all three stage of lactation. The S.N.F. content was significantly ($þ \leq 0.01$) increase with increase in stage of lactation in cow milk but in case of buffalo milk, it was increase upto middle stage of lactation but after that decrease significantly.

Thus, our study on effect of stage of lactation revealed that the chemical content in cow milk i.e. fat, lactose, protein, ash, T.S. and S.N.F. also poor than

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Table 1: Chemical quality of cows and buffaloes milk in different stage of lactation

S.No.	State of lactation	Cows	Overall average buffaloes	Test of significance
Acidity %	Early	0.13±0.001	0.12±0.001	1.034 NS
	Middle	0.12±0.001	0.11±0.001	0.961 NS
	Late	0.12±0.002	0.11±0.001	0.719 NS
	F Value	1.330 NS	0.968 NS	
Sp. gr.	Early	1.029±0.006	1.030±0.006	0.794 NS
	Middle	1.030±0.005	1.031±0.004	0.966 NS
	Late	1.028±0.007	1.030±0.005	3.463 NS
	F Value	1.136 NS	1.083 NS	
Fat %	Early	4.10±0.27	6.12±0.46	6.936 ++
	Middle	4.50±0.34	6.82±0.48	7.046 ++
	Late	5.45±0.51	8.00±0.51	9.437 ++
	F Value	7.913 ++	6.048++	
Lactose %	Early	4.70±0.31	4.74±0.46	0.469 NS
	Middle	4.65±0.36	4.64±0.49	0.981 NS
	Late	4.60±0.40	4.54±0.53	1.089 NS
	F Value	1.031NS	0.996NS	
Protein %	Early	3.25±0.44	3.66±0.48	3.864 ++
	Middle	3.39±0.39	3.84±0.51	4.116 ++
	Late	3.65±0.51	3.91±0.66	3.483 ++
	F Value	3.561 ++	4.719++	
Ash %	Early	0.69±0.003	0.81±0.006	3.506 ++
	Middle	0.71±0.006	0.83±0.009	3.693 ++
	Late	0.74±0.009	0.85±0.007	4.002 ++
	F Value	3.772 ++	3.904++	
T.S. %	Early	12.47±1.08	15.33±1.31	6.463 ++
	Middle	13.25±1.08	16.13±1.06	5.064 ++
	Late	14.44±1.24	17.30±1.11	12.641 ++
	F Value	5.116 ++	6.981++	
S.N.F	Early	8.37±0.89	9.21±1.02	4.314 ++
	Middle	8.75±0.91	9.68±1.26	5.068 ++
	Late	8.99±0.81	9.27±1.08	3.866 ++
	F Value	3.512 ++	4.743++	

Note : NS = Non-significant
++ Significant þd" 0.01

buffalo milk. The effect of stage of lactation was also observed significantly in all elements in all three stage of lactations, except lactose.

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