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Quality of milk products viz. Channa, Rabbari, and Khoa are made from milk produced by lactating crossbred cows kept on buffers added diets

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Abstract

Channa, rabbari, and khoa were manufactured using standard techniques from milk produced by crossbred cows kept either under control or buffer feed technology (BFT) and studied for their quality and recovery of product and its constituents. Six crossbred lactating cows were divided into two groups based on milk yield and fat content in milk. In T1 the animals were not given buffers whereas in T2 they were offered buffers in a combination of sodium bicarbonate and magnesium oxide @ 0.02 and 0.01% of LW, respectively. After 30 days of the experiment, the animals under T1 and T2 were switched over to T2 and T1, respectively. They were nourished to meet their daily nutrient requirement. Milk collection to prepare products was adopted after 25@ of 3 per animal per product. Products were chemically analyzed and the data recorded were subjected to statistical analysis viz. RBD for mean values and Student's T test for differences in means. SNF content in rabbari decreased and TS content in khoa increased in buffers-fed groups. Recovery of product and their constituents in both groups were similar. BFT may thus be recommended due to increased milk quality without damaging the quality and recovery of its products.

Keywords: Channa, Cow, Khoa, Magnesium Oxide, Rabbari, Sodium bicarbonate.

Introduction

Betterment in the chemical quality of milk in goats due to supplementation of buffers has been reported (Singh et al 1996). The reason for this is discussed that the addition of buffers in goat nutrition manipulated rumen fermentation for the synthesis of surplus fat (Kishore et al 1996). The milk produced by feeding buffer was essential to access the quality of products manufactured from this milk. To test TS of two kinds of milk, the best product may be khoa which is manufactured by concentrating milk

through evaporation. Sometimes yield of khoa per unit volume of milk is considered to fix the cost of milk. Similarly, to compare milk protein of two kinds of milk, the best milk product may only be channa which is manufactured by coagulating milk proteins using acids and draining the whey. Rabbari is also important milk.

Materials and methods

Six lactating crossbred cows were selected and divided into two groups based on their productive and phenotypic features. After 30 days the animals under T1 and T2 were switched over to T2 and T1, respectively. Each animal received a diet to meet their daily nutrient requirements (NRC, (1978) containing wheat straw, berseem, wheat grain, and mustard cake (Table 1). Buffers were offered only in T2 in

Table 1: Chemical composition of feeds (% DM)

Parameters	Straw	Berseem	Concentrate
DM *	87.30	22.00	91.50
TA	10.40	12.70	09.10
OM	89.60	87.30	90.90
CP	03.10	14.90	21.60
EE	01.20	04.30	02.50
TCHO	85.30	68.10	66.80
GE **	04.20	04.20	04.40
CF	36.20	29.80	08.70
NFE	36.20	38.30	58.20
Ca	00.10	02.20	00.30
P	00.10	00.10	00.20
Na	00.20	00.50	00.50
Mg	00.10	00.20	00.40
K	05.40	01.10	01.00

combination of sodium bicarbonate (SB) and magnesium oxide (MO) at the rate of 0.02 and 0.01 per cent of live weight, respectively whereas T1 served as control. The animals were milked twice a day. The milk collection trial was conducted 25 days after the start of the experiment. The quality and quantity of milk and its constituents were accessed (Table 2). The amount of milk from the individual animal to produce channa,

rabbari, and khoa was 3 liters for each. Standard techniques to manufacture the products were followed (De 1996) and the products were tested chemically (ISI 1975, Gupta et al 1988). Recovery of the products and their constituents were calculated. The statistical analysis included randomized block design over mean figures and student's T test over mean differences in two treatments (Snedecor and Cochran 1994).

Table 2 (A): Chemical quality and nutrient yield of milk

Parameter	T_1	T_2	T_1	T_2	Difference	
					T_1	T_2
Milk yield (l/d)	4.33	4.22	4.16	5.09	(-)0.17	(+)0.87
Specific Gravity	1.03	1.03	1.03	1.03	0	0
Fat (%)	4.92	3.38	4.63	5.15	(-)0.28	(+)1.77
Yield (g/d)	214	140	191	265	(-)23	(+)124
SNF (%)	9.34	9.63	9.32	9.23	(-)0.03	(-)0.4
Yield (g/d)	405	406	387	471	(-)18	(+)64
TS(%)	14.3	13	14	14	(-)0.3	(+)1.40
Yield (g/d)	619	547	578	736	(-)41	(+)188
Lactose (%)	4.61	4.68	4.62	4.68	(+)0	(+)0
Lactose(g/d)	197	197	192	237	(-)7	(+)40
Protein(%)	3.99	4.2	3.96	3.82	(-)0.04	(-)0.38
Yield (g/d)	172	177	163	197	(-)10	(+)20
Calories*	86.4	75.8	83.6	87.9	(-)2.8	(+)12.2
Yield **	3.75	3.18	3.46	4.5	(-)0.3	(+)1.32
Minerals (%)	0.74	0.75	0.74	0.76	(+)0	(+)0.01
Yield(g/d)	32.01	31.50	30.7	38.50	(+)1.3	(+)6.9
*(Kcal/100 ml); **(Mcal/d)						

Table 2 (B): Chemical quality and nutrient yield of milk

Parameter	T_1	T_2	Difference
	CD at 5%	CD at 5%	CD at 5%
Milk yield (l/d)	0.9	1	1.64
Specific Gravity	0	0	0
Fat (%)	0.54	0.97	1.3
Yield (g/d)	58	51	62.4

SNF (%)	0.33	0.89	0.99
Yield (g/d)	38	94	128
TS(%)	0.8	1.8	2
Yield (g/d)	134	141	183
Lactose (%)	0.01	0.21	0.06
Lactose(g/d)	37	63	75
Protein(%)	0.57	1.03	0.87
Yield (g/d)	47	63	49
Calories (Kcal/100 ml)	6.1	12.8	15.80
Yield (Mcal/d)	0.83	0.87	1.2
Minerals (%)	0.01	0.01	0.01
Yield(g/d)	7	7.6	12.3

Results and discussion

The chemical quality of channa produced by milk from animals kept under T1 and T2 were similar and the differences in chemical quality except minerals content were equal to zero (Table 3). The effect of mixing buffers in milk producer's diet on their performance in the quality of channa has not yet been reported in the literature but in the case of the control group, the composition of channa was almost similar to those reported by various authors i.e. fat and TS (Ray and De 1953), protein and minerals (De and Ray 1954, Balasubramaniam and Basu 1955) and lactose and SNF (Rajoria et al 1990). The recovery of product and its constituents in T2 and T2 and the differences between both the groups were equal to zero. Recovery of product from milk was equal to zero. Recovery of product from milk was similar to that reported by Ray and De (1953). The information is lacking in the literature to present the effect of feeding buffers to milk producer's animals on the quality and recovery of channa and therefore confirmation of registered effect is due.

Table 3: Chemical quality and recovery of channa.

Parameter	T1	T2	CD (5%)	Change	T value
Chemical quality (%)					
Fat	24.2±1.0	25.2±0.8	7.4	(+)1.0±1.0	(+)0.7
Protein	22.1±0.6	19.5±0.06	5.2	(-)0.6±1.1	(-)0.5

Lactose	2.33±0.04	2.37±0.05	0.15	(+)0.03±0.69	(+)0.44
Minerals	2.21±0.00	2.24±0.00	0.04	(+)0.03±0.01	(+)4.39*
SNF	24.7±0.6	24.1±0.5	6.0	(-)0.6±1.1	(-)0.5
TS	48.9±1.1	49.4±1.2	12.5	(+)0.5±0.2	(+)0.2
Recovery					
Product	14.4±0.3	14.9±0.3	2.4	(-)0.5±0.4	(-)0.2
Fat	75.4±0.9	73.1±0.5	5.3	(-)2.2±0.9	(-)2.2
Protein	73.1±1.7	76.9±2.2	12.3	(+)3.7±2.2	(+)1.6
Lactose	7.26±0.16	7.53±0.11	1.14	(+)0.27±0.20	(+)1.22
Minerals	42.9±0.9	44.2±0.9	7.1	(+)1.4±1.3	(+)1.0
SNF	38.2±1.1	38.9±0.6	8.5	(+)0.6±1.5	(+)0.4
TS	49.3±3.9	51.1±0.4	20.0	(+)1.8±3.5	(+)0.5
					* P <0.05

The chemical composition of rabbari in terms of various nutrients did not differ but the differences in all the parameters in both the treatments except SNF were equal to zero (Table 4). It can be revealed based on observations that mineral content was decreased in rabbari due to the inclusion of buffers in the milk producer's diet. The effect of the addition of buffers in dairy cattle nutrition on the composition of rabbari has not been reported so far and therefore the trend could not be verified. However, the same in the control group were according to those reported in the literature i.e. fat (Singh 1997), protein and mineral (Dubey and Gupta 1986), and TS and SNF (Singh 1995, Davies 1958, Singh 1997). The recovery of rabbari and its constituents and the differences in both groups was equal to zero. The effect of buffers addition in milk producer's diet on these aspects has not yet been discussed in the literature but for the control group, the recovery was according to those recorded by various authors i.e. De (1996).

Table 4: Chemical quality and recovery of rabbari.

Parameter	T1	T2	CD at 5%	Change	T value
Chemical quality (%)					
Fat	19.6±0.3	20.2±0.2	1.9	(+)1.5±0.3	(+)1.4
Protein	10.2±0.1	10.0±0.3	2.2	(-)0.2±0.4	(-)0.5
Lactose	16.7±0.1	16.5±0.2	1.3	(-)0.2±0.2	(-)0.7

Minerals	3.19±0.12	2.96±0.08	0.88	(-)0.28±0.15	(-)1.34
SNF	41.8±0.2	40.0±0.2	1.1	(-)0.6±0.2	(-)2.9±
TS	61.4±0.2	61.0±0.1	2.8	(-)0.1±0.5	(-)0.2
Recovery					
Product	22.8±0.9	24.8±0.8	7.0	(+)2.0±1.2	(+)1.5
Fat	96.8±0.5	97.1±0.4	3.3	(+)0.3±0.6	(+)0.4
Protein	59.4±2.7	65.4±1.1	15.1	(+)6.0±2.7	(+)2.0
Lactose	82.3±4.7	87.4±3.1	36.4	(+)5.2±4.6	(+)1.0
Minerals	97.6±0.6	96.9±2.3	3.8	(+)0.8±0.7	(-)0.7
SNF	96.0±1.5	97.7±0.9	10.2	(+)1.7±1.8	(+)0.9
TS	80.5±2.0	85.5±1.1	10.5	(+)5.0±1.9	(+)2.5
					* P <0.05

The chemical quality of khoa prepared from milk produced by the animals kept under control and buffers added diet did not differ significantly except only TS which was higher in the buffers fed group in comparison to that in the control group (Table 5). The changes however in all the parameters including TS in both the treatments were nonsignificant. It can be revealed based on these observations that the inclusion of buffers in milk producers' diets increased TS content in khoa. De and Ray (1954) reported increased content of TS in khoa with the increased fat and TS content in milk from which it was prepared. The effect of BFT application in milk producer animals on the performance in khoa has not been presented in the literature, but in the control group, it was almost in line with those reported by De (1996). Recovery of khoa from milk in the control group was almost similar to that reported by De and Ray (1954) and De (1996). Recovery of all the nutrients in both the groups was non-significant and the changes in this regard were also equal to zero. The findings are to be confirmed the effect of BFT in milk producers' diets on the recovery of khoa and its constituents.

Table 5: Chemical quality and recovery of Channa.

Parameter	T1	T2	CD at 5%	Change	T value
Chemical quality (%)					
Fat	24.3±1.3	27.0±1.1	9.6	(+)2.7±1.7	(+)1.5
Protein	20.8±0.5	20.2±2.4	3.9	(-)0.6±1.7	(-)0.3
Lactose	24.7±0.2	24.5±0. 4	2.2	(-)0.2±0.4	(-)0.4

Minerals	3.98±0.02	3.95±0.03	0.22	(-)0.00±0.00	(-)0.8
SNF	49.4±0.5	48.7±1.0	5.0	(-)0.8±1.4	(-)0.5
TS	73.7±1.1	75.7±2.0	0.4	(+)1.9±2.9	(+)0.6
Recovery					
Product	18.2±0.3	18.3±0.1	2.0	(+)0.1±0.3	(+)0.7
Fat	95.3±0.6	96.0±0.6	6.2	(+)0.7±1.1	(+)0.6
Protein	95.5±1.0	96.8±0.5	4.9	(-)1.2±0.9	(-)1.2
Lactose	96.9±0.5	95.8±0.5	5.1	(+)1.3±0.9	(+)1.4
Minerals	97.9±0.5	95.8±0.7	6.1	(-)2.1±1.1	(-)1.8
SNF	96.3±0.3	94.4±0.6	3.1	(+)0.2±0.6	(+)0.3
TS	95.9±0.3	96.2±0.6	4.0	(+)0.4±0.7	(+)0.5

Conclusion

It can be concluded based on the above study that the application of buffer feed technology in crossbred cattle does not affect the quality of milk products viz. channa, rabbari, and khoa, and the recovery of product and its constituents. It can be analyzed based on this study that the quality of milk was improved without damaging the quality of its products in the buffer-fed group.

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References

Balasubramaniam S C and Basu K P. 1995. Indian Dairyman 7: 99.

Davies W L. 1958. Indian Indigenous Milk Products. Thacckar Sprink and Company, Kolkata.

De S. 1996. Outlines of Dairy Technology. 13th Edition. Oxford Univ Press, Delhi.

De S and Ray S C. 1954. Indian J. Dairy Sci. 7: 113.

Dubey P C and Gupta P C. 1986. Quality of rabbari. J. Agric. Sci. Res. 28: 9-14.

Gupta P C, Khatta V K and Mandal A B. 1988. Analytical Techniques in Animal Nutrition. HAU, Hisar.

ISI 1975. Methods for testing Animal Feeds and Feeding stuffs. Part I: General Methods. IS: 7874; Part I. ISI, New Delhi.

Kishore A, Chandra P and Singh B P. 1996. Manipulation of rumen fermentation using buffers in caprine. In: Proceedings of the VI International Conference on Goats, May 6-11, International Academic Publishers, Beijing, pp. 570-573.

NRC 1978. Nutrient Requirements of Dairy Cattle. National Academy of Science. National Research Council, Washington, DC.

Rajorhia G S, Pal D, Garg F C and Patel R S. 1990. Effect of quality of milk on chemical sensory and rheological properties. Indian J. Dairy Sci. 43: 220-224.

Ray S C and De S. 1952. Indian Dairyman 4: 27.

Singh D. 1995. Studies on the selflife of rabbari. M.Sc.(Ag.) thesis, Dr. B.R. Ambedkar Univ., Agra.

Singh K, Kishore A, Chandra P and Ogra J L. 1996. Feeding effect of buffers in improving potentiality of milk production in goats. In: Proceedings of the VI International Conference on Goats, May 6-11, International Academic Publishers, Beijing, pp. 338341.

Singh K. 1997. Chemical and bacteriological quality of rabbari marketed in Agra city. M.Sc. (Ag.) thesis, Dr. B.R. Ambedkar Univ., Agra.

Snedecor G W and Cochran W G. 1994. Statistical Methods. 8th Edition. Iowa State Univ. Press, Ames.