A COMPARISON BETWEEN CHEMICAL QUALITY OF RAW MILK OF COW AND BUFFALO

U. K. Shukla■, Prashant Jeet Meshram♦ and Avinash Varma■

Received 03-10-2014
Accepted 23-12-2014

ABSTRACT

A study was conducted at Chitrakoot, Satna (M.P.) during March to June 2014 to evaluate the chemical quality of milk. The objective was to compare the compositional quality of raw milk of buffalo and cow. All sanitary precautions were followed to produce clean milk. The samples of raw milk collected for ten days, were tested to determine the percentage of fat, protein, lactose, ash, total solid, water, solid not fat (SNF); and specific gravity. The statistical analysis showed that the differences in percentage of fat, protein, ash, total sugar and water in the raw milk of buffalo and cow's milk were significant and the results of F-test were also found significant. The differences in percentage of lactose and SNF; and specific gravity were, however, non-significant. It was, therefore, concluded that chemical quality of cow and buffalo milk was significantly influenced. The fat per cent of buffalo milk was better than cow milk.

Key Word: *Buffalo and Cow milk, Chemical quality, Raw milk*

INTRODUCTION

In India, livestock sector has shown appreciable development over the last two decades. Milk production has increased between 3 to 4 per cent per annum and in 2012 - 13 it has reached the level of 133 million tons. It has not been a simple task to increase the milk production, from 17 million tons in 1950-51, and reached this level and become number one in world in milk production. Increase in milk production boosted the per capita milk availability of milk to the people of the country. In 1950-51, the per capita milk availability was only 130 gram per day. The national average is above the ICMR recommended level of 280 gram per day in 2013. The rate of growth in milk production is also substantially higher (3.6%) then the word 1.5%. Currently the global milk demand is growing by 15 million tons per year, mostly in developing countries. Milk is considered as the most satisfactory single food for humans. Minerals like Ca, P, Na, K, and Mg are present in appreciable quantities. This increased value of milk is being produced by small - scale dairy farmers. **(Srivastava, 2013)**.

Indian has emerged today as the largest producers of milk in the world with in annual production of more than hundred tons millions per year. But the future of India dairy Industry will have to be built society on quality so as to compete not only in domestic market but also in international market due to concept of global village **(Singh and Sachan, 2013)**.

Dairying in India offers immense opportunities to up lift the economy and to sustain the livelihood and food security for the population nurturing on dairying in the under privileged and rural areas through effective mechanism including proper livestock policy and location specific strategies, would not only boost the country's milk production but also improve the nutritional security and food security in rural masses. Traditional unorganized marketing of milk in small holder system need to be gradually shifted towards organized marketing for better and sustainable remuneration to producers **(Shrivastava, 2013)**.

Milk production has shown a rapid growth between 4 - 5% per annum during the last to decades. The growth has however slackened during the 11th five year plan. Against the targeted growth of five per cent, the actual achievement has been no more than 3 - 6 per cent. The 11th five year plan envisages overall growth of 6 - 7 per cent per annum for animal husbandry, Dairying and Fishers sector in 2011 - 12. The sector is reported to have contributed 121.84 million tons of milk (as against I.D.A. estimates for 116 million tons for 2010 - 11). The per capita availability of milk has increased from 112 gm per day in 1968 - 69 to 281 gm in 2010 - 11. The Indian dairy sector acquired substantial growth momentum from the 9th plan onwards. Dairying has become in important secondary source of income for millions of rural families and has assumed in important role in providing employment and generating opportunities. Cow's milk represents a major dietary source for young and adult humans, and cow milk proteins are considered to have a high nutritional quality. Other important components of milk include water, fat, lactose and minerals. Specifically, milk with higher content of fat and protein commands high premium **(Fayeye *et al.*, 2013)**.

Cow have contributed greatly to human welfare, supplying draft power, milk, meat, hides, variety of other products. Cow's milk has long been considered a highly nutritious and valuable human food and is consumed by millions daily in variety of products **(Mahmood and Usman, 2010)**.

MATERIALS AND METHODS

The study was conducted in the Livestock Production & Management Unit,Faculty of Agriculture, Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot,Satna (M.P.) during March to June 2014 to compare the chemical quality of raw milk of buffalos and cows. All sanitary precautions were followed to produce clean milk. The samples of raw milk were collected for ten days. 200 ml of raw milk from healthy cow and buffalo breed were collected each time in clean and sterilized conical flasks. The samples were then brought to the laboratory for chemical analysis for determining fat, protein, lactose, ash, total solids, water, solid not fat and specific gravity, as per the standard procedures as described below.

■Assistant Professor, ♦Ph.D. Scholar
Livestock Production and Management, Faculty of Agriculture,
Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot, Satna (M. P.) India

Fat per cent in milk was done by Gerber's method. Determination of solid not fat (SNF) per cent in milk was done. Fat per cent in milk determined by Gerber fat test rapidly. SNF was calculated by subtracting fat per cent from T.S. Protein content was determined by formalin titration method. Lactose per cent in milk was determined by volumetric methods. Ash content in milk was determined by method described by **(AOAC, 2000)**. Specific gravity (SP.gr.) of raw milk was determined.

The data on Chemical Parameters and compositional in gradients were tabulated and subjected to analysis of variance technique (ANOVA) as per method described to determine influence of milk yield.

RESULTS AND DISCUSSION

Fat (%) in raw milk of buffalo group B_1, B_2 and B_3 ranged from (5.06-6.45), (4.90-6.21) and (4.98-6.29) respectively and cow group C_1, C_2 and C_3 ranged from (3.17-5.16), (3.52-5.11) and (3.17-5.17) respectively.

Table : 1- Chemical composition of raw milk of buffalo and cow breeds:

Composition	Buffalo (B)			Cow (C)			Result
	B_1	B_2	B_3	C_1	C_2	C_3	
Fat (%)	5.69	5.44	5.52	4.27	4.21	4.31	Significant
Range (min.-max.)	5.06-6.45	4.90-6.21	4.98-6.29	3.17-5.16	3.52-5.11	3.17-5.17	
Protein (%)	3.81	3.68	3.77	3.68	3.73	3.80	Significant
Range (min.-max.)	3.24-5.00	3.03-4.91	3.91-4.97	3.15-4.08	3.26-4.13	3.38-4.23	
Lactose (%)	4.53	4.47	4.57	4.34	4.30	4.38	Significant
Range (min.-max.)	3.99-5.84	3.90-5.80	4.03-5.85	3.97-4.68	3.91-4.68	4.02-4.74	
Ash (%)	0.72	0.68	0.70	0.71	0.67	0.69	Significant
Range (min.-max.)	0.65-0.81	0.63-0.78	0.63-0.79	0.64-0.83	0.60-0.78	0.62-0.77	
T.S. (%)	14.83	14.63	14.14	12.94	13.20	13.45	Significant
Range (min.-max.)	13.21-16.35	13.39-15.90	12.71-15.42	12.02-13.19	12.19-14.34	12.87-14.33	
S.N.F. (%)	9.19	9.16	9.18	8.86	8.83	8.85	Non-Significant
Range (min.-max.)	7.98-10.93	7.97-10.78	7.98-10.88	8.67-9.07	8.64-8.99	8.68-9.00	
Water (%)	85.17	85.37	85.86	87.06	86.80	86.55	Significant
Range (min.-max.)	83.65-86.79	84.10-86.61	84.58-87.24	86.21-87.98	85.66-87.81	86.32-87.13	
Sp.gr. (%)	1.02	1.02	1.02	1.02	1.02	1.02	Significant
Range (min.-max.)	1.01-1.03	1.01-1.03	1.01-1.03	1.00-1.03	1.00-1.03	1.00-1.03	

B_1, B_2 and B_3 are 3 different buffalo group; each group consist of 10 numbers and C_1, C_2 and C_3 are 3 different Cow group; each group consist of 10 numbers.

Protein (%) in raw milk of buffalo group B_1, B_2 and B_3 ranged from (3.24-5.00), (3.03-4.91) and (3.19-4.97) respectively and cow group C_1, C_2 and C_3 ranged from (3.15-4.08), (3.26-4.13) and (3.38-4.23) respectively.

Lactose (%) in raw milk of buffalo group B_1, B_2 and B_3 ranged from (3.99-5.84), (3.90-5.80) and (4.03-5.85) respectively and cow group C_1, C_2 and C_3 ranged from (3.97-4.68), (3.91-4.68) and (4.02-4.74) respectively.

Ash (%) in raw milk of buffalo group B_1, B_2 and B_3 ranged from (0.65-0.81), (0.63-0.78) and (0.63-0.79) respectively and cow group C_1, C_2 and C_3 ranged from (0.64-0.83), (0.60-0.78 and (0.62-0.77) respectively.

T.S. (%) in raw milk of buffalo group B_1, B_2 and B_3 ranged from (13.21-16.35), (13.39-15.90) and (12.76-15.42) respectively and cow group C_1, C_2 and C_3 ranged from (12.02-13.79), (12.19-14.34) and (12.87-14.33) respectively.

S.N.F. (%) in raw milk of buffalo group B_1, B_2 and B_3 ranged from (7.98-10.93), (7.97-10.78) and (7.98-10.88) respectively and cow group C_1, C_2 and C_3 ranged from (8.67-9.07), (8.64-8.99) and (8.68-9.00) respectively.

Water (%) in raw milk of buffalo group B_1, B_2 and B_3 ranged from (83.65-86.79), (84.10-86.61) and (84.58-87.24) respectively and cow group C_1, C_2 and C_3 ranged from (86.21-87.98), (85.66-87.81) and (86.32-87.13) respectively.

Specific gravity of raw milk of buffalo group B_1, B_2 and B_3 ranged from (1.01-1.03), (1.01-1.03) and (1.01-1.03) respectively and cow group C_1, C_2 and C_3 ranged from (1.00-1.03), (1.00-1.03) and (1.00-1.03) respectively.

Difference in the mean values for percentage of fat, protein, lactose, Ash, T.S., water, Sp.gr. in comparing to buffalo and cow milk was significant, whereas the result for S.N.F. was non-Significant.

The overall influence of chemical quality of cow and buffalo milk was significant. The quality of buffalo milk was better than cow milk.

CONCLUSION

The above study clearly showed that the chemical composition of raw milk of buffalo is better than the raw milk of cow due to higher per cent of fat, protein, lactose, T.S., S.N.F., Specific gravity and lower percentage of water.

The differences in mean values for percentage of fat, protein, lactose, ash, T.S., water, Sp.gr. was found to be significant between raw milk of cow and buffaloes, whereas the result for S.N.F. was found to be non- Significant.

REFERENCES

AOAC (2000) Assoc. of Official Analytical Chemists, 11 ed., P. Box 540 Benjamin franklin station, Washing D. C. 20, 0444.

Fayeye *et al.*, (2013). Milk yield and quality of holstein and jersey breeds of cattle in kwara state, nigeria. *J. Agric. Res. and Dev.* 12(1)11-18.

Mahmood, Asif and Usman, Sumaira (2010). A Comparative Study on the Physicochemical Parameters of Milk Samples Collected from Buffalo, Cow, Goat and Sheep of Gujrat, Pakistan, *Pakistan Journal of Nutrition* 9 (12): 1192-1197

Shrivastava S.K (2013) Quality of raw milk produced at organized andunorganized dairy sector M.Sc. Thesis, A.A.I.D.U. Allahabad.

Singh and Sachan. (2013) Factors affecting incidence of mastitis in cross breed cow M.V.Sc thesis submitted to N.D.R.I. (Deemed University) Karnal India