



International journal of basic and applied research

www.pragatipublication.com

ISSN 2249-3352 (P) 2278-0505 (E)

Cosmos Impact Factor-5.960

Study of effect of seasonal fluctuation on the quality and compositional characteristics of buffalo milk

S.Kothandaraman¹, A.Varadarajan² and R.Gnanasekar³

1. Assistant Professor in Animal Husbandry, Faculty of Agriculture, Annamalai University, Annamalai Nagar, Pin 608001

2. Assistant Professor in Animal Husbandry, Faculty of Agriculture, Annamalai University, Annamalai Nagar, Pin 608001

3. Assistant Professor in Animal Husbandry, Faculty of Agriculture, Annamalai University, Annamalai Nagar, Pin 608001

Received: 10 April Revised: 18 April Accepted: 26 April

Abstract

The present study was undertaken in ten healthy Murrah buffaloes selected from a private farm at chidambaram. All buffaloes were reared in intensive system in a double row buffalo shed with tail to tail arrangement. The aim of the study was to analyse the effect of different seasons on the variations in the buffalo milk's composition. Milking was done by milking machine. Representative samples of 100 ml milk were collected in different seasons viz. summer, rainy and winter season. Samples of fresh milk drawn from the udder were analyzed for fat, solid not fat (SNF), total solid (TS), water, acidity percentage and specific gravity. It was concluded that the season had significant effect on Solid-not-fat (SNF), Total Solid (TS), Specific gravity and acidity percentage and non-significant effect on fat and moisture content of buffalo's milk.

Keywords: buffalo, milk composition, season, murrah.

Introduction

Buffaloes are often blamed for poor productivity in terms of milk production due to heat stress during summer season. Even with this limitation, buffaloes contribute more than 55% of total milk production of India (Kothandaraman et al., 2019). In India, with the expansion in dairy industry it becomes necessary for its future glory to find out avenues to maximize buffalo milk production. Reduction in milk yield due to heat stress is more prominent problem encountered in buffaloes. Decreased synthesis of hepatic glucose and lower non esterified and fatty acids (NEFA) level in blood during heat stress causes reduced glucose supply to mammary glands resulting in low glucose and low lactose synthesis which in turn ensues low milk yield. Reduction in milk yield is further intensified by decrease in feed consumption by animals to compensate high environmental temperature. Heat stress negatively affects the productive performance of dairy cattle (Das et al., 2016). In addition to the above, the feeding of buffaloes and season of the year has a considerable influence on milk components and properties. The feeding of buffaloes during different seasons changes the milk properties such as taste, color, fat content etc., The feeding regime offers different possibilities to the breeder with suitable diets that contain mineral and nutritional component



according to the needs of the buffaloes and the structure of the diets that enables good digestion, adequate intake and metabolism which on the other hand effects on the milk composition (Rajeevie *et al.*, 2003). Reduced milk production in buffaloes due to stress is attributable only partly to decrease in feed intake. Average daily milk yields of Murrah buffalo ranges from 5-7 liter per day. The lactation length is of 290-300 days. Inter calving period varies between 14-24 month. Milk and its products are excellent source of vital nutrients. Milk proteins offer a high quality animal protein in diet. Milk fat fractions are now being recognized to posses interesting anti-cancer properties. Minerals and vitamins contents of milk contribute significantly to human nutrition. Calcium is needed for protection against brittle bones in the latter part of life. It is now considered to play a vital role in controlling blood pressure in protecting colon from cancer. Milk and milk products from dairy animals are palatable and easy to digest therefore important human food. Milk, according to the prevention of food adulteration (PFA) rules, is the normal mammary secretion derived from the complete milking of a healthy milch animal without either addition there to or extraction there from. It is especially beneficial for young ones as it contains nutrients for growth and development particularly a sufficient concentration of quality protein, mineral and vitamins. Especially vitamin A, riboflavin and vitamin B12 are also the richest natural source of calcium in the best available form, (Pathak 2003). However, and such holistic milk's composition is markedly altered by seasonal fluctuation. Therefore the present study was undertaken to investigate the effect of different seasons on the buffalo's milk composition.

Materials and Methods

Healthy Murrah buffaloes (N=10) from a private farm located at Chidambaram, Cuddalore district were selected for the study. The present experiment was carried out for one year (Mar-2017 to Feb-2018). The buffaloes were subjected to Californian mastitis test and 10 buffaloes which showed negative are included for the experiment. All experimental animals were housed in a tail to tail barn and managed under more or less similar husbandry conditions. Sanitary precautions like clipping of long hair at udder and flank, grooming, washing of hind quarters, wiping udder with towel soaked in 2% Savlon solution, tying tail with legs etc. were taken care prior to collection of milk samples. Buffaloes were milked by employing milking machine. Two streams of fore milk from each quarter of udder were discarded and a sample of 200 ml milk was collected directly into sterilized conical flasks and plugged immediately. Milk sample were brought to laboratory for chemical analysis and the fat, solid not fat (SNF), total solid (TS), water, Specific gravity and acidity percentage was determined as per AOAC (1995). The experiment was conducted in summer (March-June), rainy (July-October) and winter (Nov-Feb) seasons.



Results and Discussion

Table 1. Mean values of various components in milk during different seasons (N=10)

Parameters	Effect of different seasons			
	Summer	Rainy	Winter	Overall percentage
Fat percentage	6.01	6.07	6.09	6.05
SNF percentage	7.88*	8.13*	8.36*	8.12
TS percentage	13.23*	14.22*	14.83*	14.09
Water percentage	84.11	83.82	83.66	83.86
Specific gravity	1.030*	1.032*	1.034*	1.032
Titratable Acidity	0.154*	0.159*	0.152*	0.155

Values bearing superscripts (*) in the same row differ significantly ($P \leq 0.0$)

Fat percent in milk

The highest mean fat percent was recorded as 6.09 in milk of buffaloes of winter season followed by 6.07 in milk of buffaloes in rainy season and 6.01 in milk of buffaloes in summer season. The differences in these were non-significant. Similar result were also reported by Bernadin (1972), Sharma *et al.* (2001), Prasad (2009), Verma *et al.* (2010) and Bahashwan (2014). The decline in fat content of milk from winter to summer is more likely to be due to increase in temperature as it is obvious that when environmental temperature increases the synthesis of fatty acids is decreased especially those fatty acid that do not come directly from blood (Adeela Yasmin *et al.*, 2012)

SNF percent in milk

The highest mean SNF percent was recorded as 8.36 in milk of buffaloes of winter season followed by 8.13 in milk of buffaloes in rainy season and 7.88 in milk of buffaloes during summer season. The differences in these were significant. Similar results were also reported by Bernadin (1972) and Verma *et al.* (2010).

TS percent in milk

The highest mean TS percent was recorded as 14.83 in milk of buffaloes of winter season followed by 14.2 in milk of buffaloes in rainy season and 13.23 in milk of buffaloes in summer season respectively, the differences in these were significant. Similar results were also reported by Bernadin (1972), Verma *et al.* (2010), Verma *et al.* (2018). The higher the TS content the better nutritional quality of milk. It may be attributed to the green and succulent fodders available during winter season.

Water percent in milk

The highest mean water percent was recorded as 84.11 in milk of buffaloes of summer season followed by 83.82 in milk of buffaloes in rainy season and 83.66 in milk of buffaloes in winter season,



the differences in these were non-significant. It may be attributed to increased consumption of water during summer than winter.

Acidity percent in milk

The highest mean acidity percent was recorded as 0.105 in milk of buffaloes of rainy season followed by 0.154 in milk of buffaloes in summer season and 0.157 in milk of buffaloes in winter season the differences in these were significant. The differences in these were significant. Similar results were also reported by Verma *et al.* (2018).

Specific gravity of milk

The highest mean Specific gravity was recorded as 1.034 in milk of buffaloes of winter season followed by 1.032 in milk of buffaloes in rainy season and 1.030 in milk of buffaloes in summer season respectively, The differences in these were significant. Similar results were also reported by Verma D.K. *et al.* (2018). The increase in specific gravity during winter season may be attributed to the increase in proteins and sugar content of the milk owing to increased consumption of lush pasture by the buffaloes in winter months.

Conclusion

Seasonal variations in the composition of buffalo milk revealed that SNF, TS, Specific gravity and Acidity had significant difference during summer, winter and rainy season. There was no significant difference in both fat percentage and water percentage during different seasons. The fluctuation in the composition of buffalo's milk may be predominantly attributed to the availability of fresh and lush pasture during winter season. In addition, buffaloes characterized by wallowing nature are more comfortable in winter than summer months owing to ambient temperature which may also be ascribed for good compositional value of milk during winter season.

References

1. AdeelaYasmin, NuzhatHuma, Masood Sadiq Butt, Tahir Zahoor and Muhammad Yasin. (2012). Seasonal variation in milk vitamin contents available for processing in Punjab, Pakistan. *Journal of the Saudi Society of Agricultural Sciences*. 11: 99-105.
2. AOAC. (1995). Association of official analytical chemists, 16th Ed. P.O. Box 540 Benjamin Franklin station washing DoC20, 0444.
3. Bahashwan S. (2014). Effect of cold and hot season on fat, protein and lactose of Dhofari cows milk. *Net journal of Agriculture Science*. 2(1):47-49.
4. Bernadin B. (1972).Seasonal variation in the composition and physicon chemical and biological proportion of milk. *Dairy Sci. Abot*. 34(7):207.
5. Das R., Sailo, L. Verma, N. Bharati, P. Saikia, J and Imtiwati KR. (2016) Impact of heat stress on heath and performance of dairy animals: A review. *Veterinary world*.3: 260-268.
6. Kothandaraman, S., John Christy, R., Varadarajan, A and Gnanasekar, R. (2019) Augmenting milk production in buffaloes by combating heat stress through strategic supplementation of drug based probiotics and immunomodulators.*The pharma innovation journal*. 8(1):314-317



International journal of basic and applied research

www.pragatipublication.com

ISSN 2249-3352 (P) 2278-0505 (E)

Cosmos Impact Factor-5.960

7. Pathak NN. (2003) Buffalo production system in India proceeding of 4th Asia buffalo congress on buffalo for food security and rural employment 25-28 Feb. New Delhi. 36-44.
8. Prasad J. (2009) Animal Husbandry and dairy Science. Kalyani publisher Ludhiana.
9. Rajeevie, M., K. Potoenik and J. Levstek, (2003). *Agriculturae Conspectus Scientificus*. 68(3): 221-226
10. Sharma RB, Kumar Manish, Pathak V. (2001) Effect of different seasons on cross-bred cow milk composition and paneer yield in sub-Himalayan region. Department of Livestock Products Technology, College of Veterinary and Animal Sciences CSK-HPKV, Palampur (H.P.), India.
11. Verma DK and Singh Neeraj RP. (2018) Influence of season on quality of cow milk produced of organized and unorganized dairy farm of Allahabad, Utter Pradesh. *International Journal of Livestock Research*,8:114
12. Verma Neeraj PS and Prasad J. (2010) Season-wise variation in bacteria density and chemical quality of raw milk produced at SHIATS dairy farm. *Allahabad Farmer*. 65(2):4-7.