International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(2): 2085-2088

Received: 16-01-2019
Accepted: 20-02-2019

Goutam Neha
Department of NRM, Faculty of Agricultural Science and Technology, M.G.C.G.V, Chitrakoot, Satna, Madhya Pradesh, India

UK Shukla
Department of NRM, Faculty of Agricultural Science and Technology, M.G.C.G.V, Chitrakoot, Satna, Madhya Pradesh, India

Rafiya Ameen
Department of NRM, Faculty of Agricultural Science and Technology, M.G.C.G.V, Chitrakoot, Satna, Madhya Pradesh, India

Rajkaran Patel
Department of NRM, Faculty of Agricultural Science and Technology, M.G.C.G.V, Chitrakoot, Satna, Madhya Pradesh, India

Nag Khiromani
Research Scholar (Ag.) Hort., Department of Floriculture and Landscape Architecture, College of Agriculture, Indira Gandhi Krishi Vishwa Vidyalaya, Krishak Nagar, Raipur, Chhattisgarh, India

Correspondence
Goutam Neha
Department of NRM, Faculty of Agricultural Science and Technology, M.G.C.G.V, Chitrakoot, Satna, Madhya Pradesh, India

To assess the chemical quality of buffalo milk (Lactose, ash, total solid and water)

Goutam Neha, UK Shukla, Rafiya Ameen, Rajkaran Patel and Nag Khiromani

Abstract
The present study entitled "To assess the chemical quality of buffalo milk (lactose, ash, total solid and water)" was carried out during February to March 2018 at the Livestock Production and Management Department of N.R.M., Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot – Satna (Madhya Pradesh), to study the chemical qualities of Buffalo milk. The data collected for, animals each, *viz*., Buffalo, for ten days as replicates, on different parameters, were statistical analysis to applying the technique of analysis of variance (F-test). The results of the investigation regarding the chemical qualities of Buffalo milk have been presented in tables graphically represented in the preceding observations. Results of the experiment are summarize *viz.*, maximum lactose percentage, ash percentage, Total solid percentage were found higher in Buffalo milk. Water content was recorded lower in the milk of Buffalo.

Keywords: Chemical, quality, buffalo, milk, (lactose, ash, total solid, water)

Introduction
Milk is an important source of all basic nutrients and it is a substantial diet in food commodities. Because of its valuable ingredients ideally quantized makes it precious alone or a part of food globally. Milk, which is the secretion of the mammary glands, is the only food of the young mammal during the first period of its life. The substances in milk provide both energy and the building materials necessary for growth. Milk also contains antibodies which protect the young mammal against infection. An average composition of buffalo milk is 87.2% water, 3.7% fat, 3.5% protein, 4.9% lactose and 0.7% mineral oxides. Milk plays a tremendous role in building a healthy society and can be used as a vehicle for rural development, employment and slowing down the migration of the rural population. It is ideal for microbial growth and the fresh milk easily deteriorates to become unsuitable for processing and human consumption. But milk adulteration is a common phenomenon, especially in certain areas of the world where water, starch solution, industrial alkalies and nitrites are common materials added in milk. Milk adulteration leads to economic losses, deterioration of the quality of the end products and a risk to the consumer's safety (Mabrook and Petty, 2003) [4]. Reference the buffalo milk contributes 12.5% of total milk production worldwide (82 on billion litres/ year) when compared to 84% of cow milk (551 billion litres/year) Dresch referrared "goat as the poor man's cow due to its great contribution to the health and nutrition of the landles and rural people. Consumption of goat milk should be enhanced because of that therapeutic of goat milk should be enhanced because of that therapeutic properties and nutrition value. The main aim of this present study was to analyze and compare the chemical composition of cow and buffalo milk. There has been an increasing demand for cheese made of buffalo milk in many countries throughout the world as it is an organic product (Bilal *et al*. 2006) [2]. Carbohydrates are preliminary form of glucose circulating as lactose in milk. High fat and calorie contents besides dry matter are regarded as the superior and distinctive property of buffalo milk. Buffalo milk is processed into many products including butter, cream, hard and soft cheese, ice-cream and yogurt. Raw milk (RM) often contains microorganisms which may cause food borne diseases (Steele *et al*., 1997) [7]. In mastitis milk, the changes in composition impair coagulation, cheese yield, and composition; some composition changes lead to poor quality cheese and elevated SCC were associated with the production of a cheese with high moisture content. Pathogens that have been involved in food borne outbreaks associated with the consumption of milk include Listeria mono-cytogenes, *Salmonella spp.*

Escherichia coli and Staphylococcus aureus. The presence of these pathogenic bacteria in milk emerged major public health concerns, especially for these individuals (Ryser, 1998) [6]. Milk is a complex mixture of fats, proteins, carbohydrates, minerals, vitamins and other minor constituents dispersed or dissolved in water (Harding, 1999) [3]. Milk is an important part of the human diet and the nutritional significance of milk is apparent from the fact that daily consumption of a quart (1.14 liters) of milk furnishes approximately all the daily requirements from fat, calcium, phosphorus, riboflavin, one half of the protein, one third of vitamin A, ascorbic acid, thiamine and one fourth of calories needed daily by an average individual (Bilal & Ahmad, 2004) [1].

Material and Methods

Collection of raw milk samples; estimation of lactose: This method is useful in distinguishing milk sweets prepared from Khoa and Paneer or Channa. The above method is based upon the reaction of lactose with methylamine in hot alkaline solution to form a red complex which absorbs at 540 nm. The method is useful for differentiating Khoa based and Chhanna based sweets. To 8.0 g of well mixed sample add 1 ml of ZAPT reagent, dilute to 10 ml, and after 10 minutes filter using Whatman No. 1 filter paper. ii) To 0.5 ml of the filtrate add 0.5 ml of NaOH solution, dilute to 10 ml and filter using Whatman No. 1 filter paper. Dilute 5 ml of the filtrate to 10 ml. Pipette 5 ml each of working standard lactose and unknown solution into 25 ml test tubes. Add 5 ml of glycine NaOH buffer, 0.5 ml of methylamine solution and 0.5 ml of sodium sulphite solution in each tube, mix thoroughly. Heat tubes in a thermostatically controlled water bath at 65°C for 25 min. and cool immediately in an ice water bath for 2 min. to stop the reaction. Read absorbance against blank at 540nm in a spectrophotometer or a suitable spectrophotometer. Draw a standard curve by plotting absorbance against concentration of lactose and determine the concentration of lactose from it.

Estimation of Ash: Total nitrogen content in milk powder sample is estimated by Kjeldahl method as described for milk. The percent nitrogen obtained is multiplied by a factor to get protein content in milk powder sample.
The ash value can be calculated by following formula-

Calculate Crude Protein Content = N x 6.38

Where,
N = Nitrogen content in sample estimated by Kjeldahl method

Determination of Total Solids: In this procedure, a known quantity of milk is dried on a boiling water bath. Subsequently sample is dried in hot air oven at 102 ±2°C and from the weight of the residue, the total solids content in milk is determined. Transfer sample to a beaker, warm slowly to 35° - 40°C on a water bath with careful mixing to incorporate any cream adhering to the sample. Cool the sample quickly to room temperature. Heat a dish with its lid alongside in the drying oven at least 1 hour. Place the lid on the dish and immediately transfer to desiccators. Allow cooling to room temperature (at least 30 mins) and weighing to the nearest 0.1 mg. Add 5 ml of prepared sample, place the lid on the dish and weigh again. Place the dish without the lid on the vigorously boiling water bath in such a way that the bottom of the dish is directly heated by the steam. Continue heating till most of the water is removed. Remove the dish from the water bath, wipe the underside and place it in the oven alongside the lid and dry in the oven for 2 hours. Place the lid and transfer to the desiccators. Allow the dish to cool and weigh to the nearest 0.1 mg. Again heat the dish with its lid alongside in the oven for 1 hour. Place the lid on the dish and immediately transfer to the desiccators. Allow to cool and weigh again. Repeat the operation again until the difference in the two consecutive weighing does not exceed 1 mg. Record the lowest mass.
The Total Solid can be determine using following formula-

$$\text{Total Solid Content} = \frac{M2 - M0}{M1 - M0} \times 100$$

Where,
M0 = mass in g of dish + lid
M1 = mass in g of dish + lid and test portion
M2 = mass in g of dish + lid and dried test portion
Round the value obtained to nearest 0.01 % (m/m)

Results

The present investigation entitled "To assess the chemical quality of buffalo milk (lactose, ash, total solid and water)" was carried out during Feb. to March 2018 at the Livestock Production and Management, to study the chemical qualities of raw milk of Buffalo. The results of the investigation regarding the chemical qualities of Buffalo milk have been summarize are as under;

Lactose (%): The data showing lactose percentage in the Buffalo milk is presented in the following observations were made - Lactose percentage in individual Buffaloes ranged from 4.10 – 6.00, 4.00 – 5.95, and 4.14 – 6.00, with a mean of 4.66, 4.59 and 4.69 in Buffalo B_1, B_2 and B_3, respectively. The maximum lactose percentage (4.69) was found in B_3 followed by B_1 (4.66) and B_2 (4.59) and the differences between the mean values was significant. The overall mean lactose in Buffalo milk was found 4.65%. Higher mean lactose percentage was recorded in the milk of Buffalo (4.66, 4.59, 4.69 and overall 4.65). The differences in the lactose percentage in Buffalo milk due to different animals, (three) each, as also due to replication, were significant.

Ash (%): The data recorded on ash percentage in the Buffalo milk is presented in the following observations were made - The mean ash percentage in the Buffalo milk in ten replications, ranged from 0.66 – 0.85 and 0.64 – 0.86, respectively. Ash percentage in individual Buffaloes ranged from 0.68 – 0.84, 0.66 – 0.80, and 0.66 – 0.85, with a mean of 0.75, 0.72 and 0.74 in Buffalo B_1, B_2 and B_3, respectively. The maximum ash percentage (0.75) was found in B_1 followed by B_3 (0.74) and B_2 (0.72) and the differences between the mean values was significant. The overall mean ash in Buffalo milk was recorded 0.74%. Higher mean ash percentage was recorded in the milk of Buffalo (0.75, 0.72, and 0.74. The differences in the ash percentage in Buffalo milk due to different animals, each, as also due to replication, were non-significant.

Total solid (TS) (%): Total solid percentage in individual Buffaloes ranged from 13.56 – 16.77, 13.88 – 16.32, and 13.12 – 15.85, with a mean of 15.22, 15.03 and 14.69 in Buffalo B_1, B_2 and B_3, respectively. The maximum total solid percentage (15.22) was found in B_1 followed by B_2 (15.03) and B_3 (14.69) and the differences between the mean values was significant. The overall mean total solid in Buffalo milk was found 14.98%. Higher mean total solid percentage was

recorded in the milk of Buffalo (15.22, 15.03, 14.69 and overall 14.98). The differences in the total solid percentage in Buffalo milk due to different animals, each, as also due to replication, were significant.

Water (%): The data showing water percentage in the milk of Buffalo is presented in Table 1.0 the following observations were made - The mean water content in the Buffalo milk, Water percentage in individual Buffaloes ranged from 83.23 – 86.44, 83.68 – 86.12, and 84.15 – 86.88, with a mean of 84.78, 84.98 and 85.13 in Buffalo B_1, B_2 and B_3, respectively. The minimum water percentage (84.78) was found in B_1 while the maximum was in B_3 (85.31) followed by B_2 (84.98) and the differences between the mean values was significant. The overall mean water in Buffalo milk was found 85.02%. Lower mean water percentage was recorded in the milk of Buffalo (84.78, 84.98, and 85.31 and overall 85.02). The differences in the water percentage in Buffalo milk due to different animals, each, as also due to replication, were significant (1.0).

Table 1: ANOVA for Water (%) in Buffalo milk

Source of variation	D. F.	S.S.	M.S.S.	F. Cal.	F. Tab 5%	Result	CD at 5%
Due to Replication	9	21.330	2.370	43.83	2.47	S	-
Due to Buffalo (B)	2	1.418	0.709	13.11	3.55	S	0.40
Due to Error	18	0.973	0.054	-	-	-	-
Total	29	23.721	-	-	-	-	-

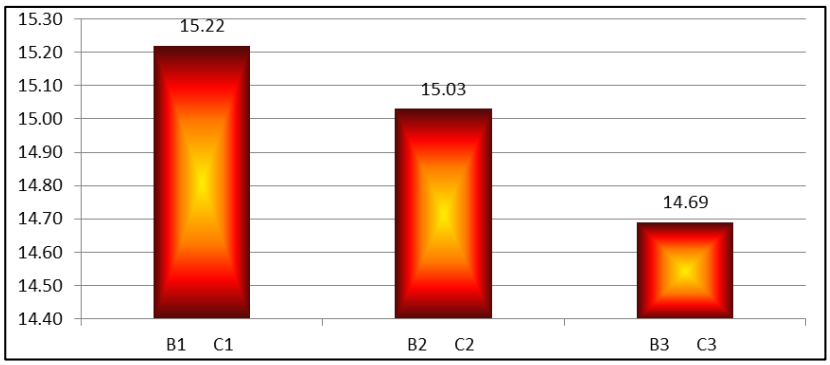

Fig 1: Water (%) in Buffalo Milk

Discussion

The results of the investigation regarding chemical qualities of Buffalo milk have been presented in tables and graphically represented the differences in these values due to animal each, as well as due to replication, were found significant. Lactose (%): present the data on lactose percentage in raw milk of Buffalo. The results contained in the Table showed that Buffalo registered mean lactose percentage as 4.66, 4.59, 4.69 (overall 4.65) and 4.47, 4.43, 4.52 (overall 4.47), respectively. The differences in these values due to three animals each, as well as due to replication, were found significant. Ash (%): present the data on ash percentage in raw milk of Buffalo. The results contained in the Table showed that Buffalo registered mean ash percentage as 0.75, 0.72, 0.74 (overall 0.74) and 0.73, 0.71, 0.72 (overall 0.72), respectively. The differences in these values due to three animals each, as well as due to replication, were found significant. Total solid (%): The data on total solid percentage in raw milk of Buffalo is furnished in the results contained in the Table showed that Buffalo registered mean total solid percentage as 15.22, 15.03, 14.69 (overall 14.98) and 13.32, 13.54, 13.81 (overall 13.55) respectively. The differences in these values due to three animals each, as well as due to replication, were found significant. Water (%): The data on water percentage in raw milk of Buffalo is furnished in Table 1.0 and Fig. 1.0 The results contained in the Table showed that Buffalo registered mean water percentage as 84.78, 84.98, 85.31 (overall 85.02) and 86.68, 86.46, 86.19 (overall 86.45) respectively.

Summary

The present study entitled “To assess the chemical quality of buffalo milk (lactose, ash, total solid and water)” was carried out during Feb. to March 2018 at the Livestock Production and Management Department of N.R.M., Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot – Satna (Madhya Pradesh), to study the chemical qualities of milk of Buffalo. The data collected for various animals, each, *viz*., Buffalo, for ten days as replicates, on different parameters, were statistical analysis to applying the technique of analysis of variance. The results of the investigation regarding the chemical qualities of Buffalo milk have been presented in tables and graphically represented in the observation. Results of the experiment are summarize *viz.*, Buffalo milk recorded maximum lactose percentage, higher ash percentage, total solid percentage in Buffalo milk was found higher than that in other milk. Water content was recorded lower in the milk of Buffalo.

Conclusion

In view of the findings and results presented above, it February to March be concluded that the chemical quality of Buffalo milk was superior in other milk. All the animals showed considerable variation regarding the principal components in milk. In earlier studies, buffalo milk showed advantages compared to other milk with regard to milk components. Buffalo milk should also be preferred from a nutritional point of view because of their high protein content and type, free amino acids, naturally occurring peptides, fat content, conjugated linoleic acid precursors and isomers, total unsaturated lactose, minerals, Ca, P, Mg, Mn and Zn. They were also low in α_{s1}-casein and β-lacto globulin, the two major milk allergen.

References

1. Bilal MQ, Ahmad A. Dairy Hygiene and Disease Prevention. Pakistan Vet. J. 2004, 25(1).

2. Bilal MQ, Suleman M, Raziq A. Buffalo: Black Gold of Pakistan. Livestock Res. Rural Dev. 2006; 18:128.
3. Harding F. Milk Quality Chapman and Hall Food Science Book, Aspen Publisher, Inc. Gaithersburg, Maryland, Aspen, 1999.
4. Mabrook MF, Petty MC. A novel technique for the detection of added water to full fat milk using single frequency admittance measurements. Sensors and Actuators B: Chemical. 2003; 96:215-218.
5. Ng-Kwai-Hang, Hayes KF, Moxley JE, Monardes HG. Variability of test-day milk production and composition and relation of somatic cell counts with yield and compositional changes of bovine milk, J Dairy. Sci. 1984; 67:361-366.
6. Ryser ET. Public health concerns. In Marth E H, Steele J L., (Eds.) Appl. Dairy Microbiol. Marcel decker, inc., New York. 1998, 263-403.
7. Steele ML, Mcnab WB, Poppe C, Graffiths MW, Chen S, Degrandis SA *et al*. Survey of Ontario bulk tank milk for food borne pathogens. J Food Prot. 1997; 60:1341-1346.