ISSN: 0976-3031

Available Online at http://www.recentscientific.com

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 8, Issue, 4, pp. 16612-16614, April, 2017

International Journal of Recent Scientific Research

DOI: 10.24327/IJRSR

Research Article

A COMPARATIVE STUDY ON THE CHEMICAL PARAMETERS OF MILK SAMPLES COLLECTED FROM COW, BUFFALO AND GOAT AT DINDIGUL DISTRICT, TAMILNADU, INDIA

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DOI: http://dx.doi.org/10.24327/ijrsr.2017.0804.0183

ARTICLE INFO

Article History:

Received 18th January, 2017
Received in revised form 10th February, 2017
Accepted 06th March, 2017
Published online 28th April, 2017

Key Words:

Milk, protein, fat, cow, goat, buffalo

ABSTRACT

The present investigation was to compare the variations in composition of milk samples in three different species of cattles like cow, buffalo and goat. Milk samples were collected from Manjanayakkanpatti village at Dindigul District, Tamilnadu, India and analyzed for different chemical parameters including, protein, fat, total solids, water, acidity and pH values. It was recorded that cow milk contains 3.39% of protein, 5.8% of fat, 1.75%Total solids, 14.75% Water, 0.137 % of Acidity and 6.6 pH values. Goat milk contains 6.005% of protein, 5.89% of fat, 16.54% of Total solids, 0.005% of water, 0.1375 % of Acidity and 6.55 pH values. The buffalo milk contains 4.85%of protein, 9.95% of fat, 18.97% of Total solids, 8.075% of water, 0.139% of Acidity and 6.75 pH values. All the tested parameters were lower in cow milk than goat and buffalo milk.

INTRODUCTION

Milk is a natural food and plays a significant role in nutrition, growth and resistance to diseases. This is mainly due to its high nutritious value especially acts as an excellent sources of minerals (such as magnesium, calcium, phosphorus and potassium) Vitamins (A, D, B-12, and C) and protein. Milk and milk products held the first position in human food, because it is essential for growing children. At the same time the composition of milk has increasing importance for fixing the price of milk. Protein and fat content in milk plays a crucial role in price fixing programmes. The quantity and the composition of milk mostly depend on the basal diet of the cattle's feed. Besides cow milk, buffalo milk contains richest source of nutrients especially fat which is responsible for high energy and nutritive value. According to the report of IDE [(12)] the buffalo milk production contributes 12.5% of total milk production worldwide (82 billion litres/year) When compared to 84% of cow milk (551 billion litres/year). Dresch[(8)] referred "Goat' as the poor man's cow due to its great contribution to the health and nutrition of the landless and rural people. Consumption of goat milk should be enhanced because of that therapeutic properties and nutrition value [(11)]. The main aim of this present study was to analyze and compare the chemical composition of cow, buffalo and goat milk.

MATERIALS AND METHOD

Study Animals

In this study a total of three cows, three goat and three buffalo were selected. Which are managed in a farmer house. The cows and buffalo were provided with the fed hay and fresh grass in the morning and evening and also allowed for field grazing during the day time and goat with fed groundnut leaves and other variety of fence leaves. They have ad libitum water supply.

Collection of milk sample

Fresh milk samples were collected from the individual animals by hand milking and milk samples collected in separate sterilized containers used for sample collection. Then the collected samples were immediately transferred directly to an ice-box and send to the laboratory without delay for analysis of chemical composition.

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Analysis of Chemical Composition

Protein content was analysed by using Kjeldahl method [3]. Gerber method [24] was employed for determining the fat content in samples. A total solid was determined by using Gravimetric method[17]. Water content was estimated by the method of [3]. Titrimetric method described by AOAC [4] was used to measure the titratable acidity of milk samples. pH Values of milk samples was measured by using digital pH-meter (Inolab WTW Series 720).

RESULTS

The Protein content in milk of three species of cattles cow, goat and buffalo are given in Table 1. The protein content in goat milk is higher (6.005) when compared to buffalo milk (4.85%) and cow milk (3.39%).

Table 1 Protein content of milk samples collected from cow, goat and buffalo.

	Protein content (%)		
Source of milk	Min	Max	Mean
Cow	3.29	3.49	3.39
Goat	5.6	6.41	6.005
Buffalo	4.76	5.01	4.85

Min=Minimum, Max=Maximum.

Table 2 Fat content of milk samples collected from cow, goat and buffalo.

	Fat content (%)		
Source of milk	Min	Max	Mean
Cow	4.95	6.65	5.8
Goat	5.79	6.00	5.89
Buffalo	9.90	10.0	9.95

Min=Minimum, Max=Maximum

Table 3 Total Solids content of milk samples collected from cow, goat and buffalo

	Total Solids content (%)		
Source of milk	Min	Max	Mean
Cow	14.55	12.96	13.755
Goat	16.09	17.00	16.545
Buffalo	18.85	19.09	18.97

Min=Minimum, Max=Maximum

The fat content in milk was lower in cow than that in the milk of other species of goat and buffalo milk. The amount of fat content in buffalo milk was higher in (9.95%) than that of (5.89%) goat milk (Table 2). Table 3 illustrated that the concentration of total solids was lower (13.755%) in cow milk compared to16.545% in goat milk and 18.97 buffalo milk. The concentration of total solids in buffalo milk was higher than that in cow and goat milk. Table 4 showed the mean value of Water content in milk samples of cow (14.75 %,) Goat milk in (0.005 %) and (8.075 %) milk. Water content of milk is higher in cow than that of buffalo. The buffalo milk contains higher water content than that of goat milk. The values of titratble acidity of milk samples collected from cow, goat and buffalo are given in Table 5. The values of titratble acidity were higher in buffalo milk (0.139%) when compared to cow (0.137%) and goat milk (0.1389%). Difference between the values of titratable acidity of cow and goat milk was non-significant. The pH value of milk samples collected from different species was determined at the period of sampling. The values of pH of milk samples of different species are shown in Table 6. The results showed that pH values were in the range of (6.6) in cow milk, (6.55) in goat milk and (6.75) buffalo milk. The pH value of buffalo milk (6.75) was higher compared to goat (6.55) and cow (6.6) milk.

Table 4 Water content of milk samples collected from cow, goat and buffalo

	Water Content (%)		
Source of milk	Min	Max	Mean
Cow	14.1	15.4	14.75
Goat	00.00	00.01	0.005
Buffalo	7.34	8.81	8.075

Min=Minimum, Max=Maximum

Table 5 Titratable Acidity content of milk samples collected from cow, goat and buffalo

	Titratable Acidity (%)		
Source of milk	Min	Max	Mean
Cow	0.135	0.139	0.137
Goat	0.138	0.139	0.1385
Buffalo	0.137	0.141	0.139

Min=Minimum, Max=Maximum

Table 6 pH value of milk samples collected from cow, goat and buffalo

	pH value		
Source of milk	Min	Max	Mean
Cow	6.5	6.7	6.6
Goat	6.5	6.6	6.55
Buffalo	6.7	6.8	6.75

Min=Minimum, Max=Maximum.

DISCUSSION

During this present investigation the protein content was higher in goat milk compared to buffalo and cow milk. But buffalo milk has more protein than cow milk [17] [11] [1]. It was observed that protein content found in buffalo milk was in accordance with the findings of [15]. Protein content in cow milk recorded in this present study was 3.39%. This finding was supported by [15] [9] [16] [21]. Protein content found in goat milk during this investigation was similar to the findings of [20] and [2]. This was supported by the report of Ganguli and Ahmad[1,11]. Buffalo milk is nearly twice as rich in fat as compared to cow milk and the most important fraction responsible for its high energetic and nutritive value [26]. Samia *et al*[21] reported the average value of fat content in cow, buffalo and goat were 4%, 7.79% and 3.99 respectively. These values are lower when compared to the fat content obtained in this study. The concentration of total solids found in the buffalo milk was similar to the report of [26] [5] and [6]. The concentration of total solids found in cow milk during this investigation was coincided with the findings of [15] [9] and [16]. The concentration of total solids found in goat milk was similar to the report of [13] and [15]. The values of the titratable acidity in buffalo milk were in accordance with the findings [18]. The values of titratable acidity in cow milk was similar to the report of [9] and [16]. The titratable acidity values of goat milk were similar to the findings of [9]. Acidity of milk is due the presence of lactic acid, citric acid and phosphoric acid [7]. The pH values found in buffalo milk were in accordance with the findings of [5] [13] and [15]. pH values found

in cow milk were in agreement with the findings of [14]. pH values of goat milk was similar to the report of [22].

CONCLUSION

All the examined parameters were lower in cow than goat and buffalo. Accurate protein in goat milk were higher than that in buffalo and cow milk but fat, total solids, titratble acidity and pH were higher in buffalo milk compared to goat and cow milk. Also the quality and the composition of the milk are of general importance to the dairy industry and human health because milk composition is linked to milk process capability. When the milk has elevated protein content it should be processed to cheese. If it has higher level fat, then it should be used to produce butter.

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