Journal of Applied Agricultural Economics and Policy Analysis, 2018, Vol. 1, No. 1, 1-7
Available online at http://pubs.sciepub.com/jaaepa/1/1/1

DOI:10.12691/jaaepa-1-1-1

Detection of Adulteration and Quality Evaluation of Raw Milk Collected from Local Markets in Bangladesh

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Abstract This experiment was aimed to detect adulteration and evaluate the quality (physical, chemical and microbiological of raw milk collected from local markets. For this purpose, the milk samples were collected from Narikali Bazar, Sofir Mia Bazar and Sokal Bazar of Jamalpur district in Bangladesh. Parameters were used to detect adulteration such as presence of Formalin, Starch, Cane Sugar and coloring agent, and to monitor the qualities of milk samples on the basis of physical tests (color, flavor, taste, texture and specific gravity), chemical tests [acidity (%), fat (g/kg), ash (g/kg), protein (g/kg), lactose (g/kg), TS (g/kg) and SNF (g/kg)]-and microbiological tests (total viable count and coliform count, CFU/ml). From the physical test it was found that all the market samples were yellowish white in color, normal in taste and flavor and free flowing fluid in case of texture. All of the raw milk samples did not fulfill the legal standard of milk composition. However, raw milk samples of Sokal Bazar were higher in fat, protein, lactose, SNF and TS contents than the other two sources of raw milk samples. Microbiological parameters (total viable count and Coliform count) also remained high in all raw milk samples than the standard. It was observed that there was no adulteration in any of the collected raw milk samples. This study revealed that hygiene condition did not properly maintain during milking and transportation of the raw milk supplied in the local markets.

Keywords: *raw milk, adulteration, food, milk quality, milk components, Banglades*

Cite This Article: Md. Anwarul Islam, Md. Touhiduzzaman Sarker, Adhita Sri Prabakusuma, Md. Imrul Hasan Russel, and Md. Shahidul Islam, "Detection of Adulteration and Quality Evaluation of Raw Milk Collected from Local Markets in Bangladesh." *Journal of Applied Agricultural Economics and Policy Analysis*, vol. 1, no. 1 (2018): 1-7. doi: 10.12691/jaaepa-1-1-1.

1. Introduction

As a third world country, Bangladesh suffers from malnutrition severely. It has an average of 1.47 lakh square kilometers with population of 154 million, of which 28 per cent live in urban and 72 per cent in rural areas. The sources of balanced diet are very challenging here for the people. Hasan and Rakib [1] reported that the average milk production per cow per year is about 2190 kg in developed countries, 1220 kg in Asia whereas 206 kg in Bangladesh. Milk is the lacteal secretion of healthy animal. It can be obtained 15 days before or 5 days after calving. It is colostrum free and containing the minimum prescribed percentage of milk fat (3.5%) and solids not fat (8.5%) [2]. Milk is an essential item of the daily food for the growing children and expectant mothers [3]. In Bangladesh, milk is produced mostly in a non-organized way and usually it is being supplied to the consumers from the urban and rural areas by middleman [4]. Most of the dairy farmer's livelihood depends on rearing cow and selling milk [5]. It is very common in rural areas by which dairy farmer of rural area earn money by selling milk and it helps to reduce their poverty and food insecurity [6,7,8]. Women farmer also can rear milking cows in the riverine island char areas of Bangladesh which empowers themselves [9,10,11]. Although there are little milk pockets especially Milk Vita and some established dairy farm where surplus milk is readily available, this perishable product has neither received particular attention by hygienic distribution to the consumers [12,13]. Dairy farmer needs capital for purchasing healthy cow and rearing so that the production can be increased with improved milk quality. The capital can be borrowed from commercial banks of Bangladesh but it needs special attention of government [5,14]

Milk is the heterogeneous product and an almost complete and well-balanced food for the newly born infant or animal [15,16]. Farkye (2003) showed that milk contains on average 87.7% water, 4.9% lactose (carbohydrate), 3.4% fat, 3.3% protein, and 0.7% minerals. Besides, milk contains considerable amounts of fat soluble vitamins (Vit-A, D, E & K) and water-soluble vitamins (Vit-B complex). Javaid et al. [17] reported that Milk is a

compulsory part of daily diet for the expectant mothers as well as growing children. Milk-fat is an important element of milk due to its nutrias value. It is easily digestible and serves as the concentrated source of energy and each gram of fat furnishes 9 calories energy, which is 2.25 times more than protein and carbohydrate. It is a carrier of fat-soluble vitamins and helps in lactose assimilation [18]. The protein of milk is not a single compound but includes three major proteins namely: casein (80 % of total protein) and lactalbumin (18%) and lactoglobulin (2 %). Among them Casein is the principal protein component of milk. The essential amino acids like tryptophan and lysine are present in large quantity in milk, which are deficient in vegetable protein. Besides glutamic acid present in cow's milk are 3 times higher than in human milk, which results a reduction of cholesterol level in blood. Oratic acid of milk protein improves liver detoxification. Another content taurine is responsible for the development of immature brain tissue of mammalian young. Lactose the only milk sugar is an excellent food for babies. Lactose has favorable influence on the utilization of calcium through formation of calcium lactate in the intestine [1]. Moreover, galactose the special component of lactose is essential for nervous system. Lactose provides an important role for growth and development of central nervous system as well as brain tissue of mammalian baby. Milk is an excellent source of calcium and phosphorus, which are important in the formation of bone and teeth. Calcium aids in the contraction and relaxation of heart muscles inducing clotting of the blood to prevent fetal bleeding and maintains buffer capacity of blood. Most of the essential minerals needed by the body are present in the milk. Milk is also a rich source of all known vitamins except vitamin C, which are essential for human health and nutrition. More over some are present in large quantities than human requirement [10]. Milk also contains Vitamin E, which cures heart disease. Most of the milk in Bangladesh is consumed by farming households or sold on the informal market, and less than 20 per cent is delivered to formal milk processors. Khan et al. [19] reported that in Bangladesh, Milk collector (Goala) collects milk from rural and urban areas and sell it to the market. It is main professions of so many people who lead their livelihood on it. Goalas purchase milk from different small holder dairy farmers and local markets. Besides dairy farmer sells their milk by themselves in the local market and earn money which helps to reduce poverty and improving food security. There is some established milk processing center in Bangladesh which collects milk from dairy farmers through milk collector and process it for future use by packaging. Islam et al. [20] found the supplied milk occasionally adulterated. Knowledge of the different levels of microorganisms in milk is very essential to determine its quality and capture long term demand for milk by consumers for a successful dairy operation [1]. The consumer usually suffers for milk adulteration so they want to get fresh, clean and pure milk and pathogen free [21,22]. In these reason, the nutritive value of milk depends on its freshness, cleanliness, purity and wholesomeness. Global data indicate that during the last 20 years, the world has witness spectacular expansion in the livestock industries. Farrell [23] reported that Milk is expected to increase by 64% in the world by the year 2020. So, it is necessary to increase milk production to mitigate the requirement. Milk can undergo spoilage due to action of various microorganisms. Flavor deterioration, Souring, discoloration, gassiness, and many other defects causes due to presence of undesirable bacteria in milk. Lactose is broken down to glucose and galactose by microbial enzyme lactase and finally lactic acid is produced from glucose. Haasnoot et al. [24] showed that the main cause of losses in quantity and poor quality of milk are Milk adulteration, poor hygiene, malpractices, lack of preservation technology, cooling facilities and sanitation conditions. The chief ways of adulteration of milk are addition of water, flour and sugar. This adulterated milk may cause various diseases to the consumers. For this reason, technical knowledge is important to examine adulterated milk.

The examination of market milk in different parts of our country would be valuable addition to our knowledge of dairy technology. The present study was under taken with the aim of detecting adulteration and evaluating the hygienic quality (physical, chemical and microbiological) of raw milk from local markets of Jamalpur district in Bangladesh. The specific objectives are (a) to determine the type of adulterants and frequency of adulteration in the raw milk supplied, and (b) To evaluate the quality of raw milk in terms of physical, chemical and microbiological parameters.

2. Materials and Methods

2.1. Site Selection and Collection of Sample

The experiment was conducted, firstly to collect the milk sample from different local markets of Jamalpur Upazila; secondly adulteration, organoleptic, chemical, and microbiological test was observed [25]. The samples of milk were collected from the 3 different places of Jamalpur Upazila. These samples were collected from the following places: Narikali Bazar, Sofir Mia Bazar and Sokal Bazar of Jamalpur Upazila of Bangladesh. The present experiment was conducted at Dairy Science laboratory of the Department of Dairy Science, Bangladesh Agricultural University, Mymensingh during the period from 1st July to 13th November, 2013. Individual raw milk samples were collected from local markets at Jamalpur Upazila. The selected markets were Narikali Bazar, Sofir Mia Bazar and Sokal Bazar were designated by the sample as Narikali Bazar, Sofir Mia Bazar, and Sokal Bazar. Before collection, milk carrying pots were cleaned and dried properly in order to avoid any kind of external contamination or adulteration. Samples were collected 3 times from 3 local markets and each time 3 samples were collected. These samples were analyzed in the laboratory during the experimental period.

2.2. Analysis of the Samples

Different tests related to detection of adulteration, organoleptic, chemical [25] and microbiological parameters were conducted for each milk sample to monitor their adulteration and quality status [26].

2.2.1. Adulteration Test

Adulteration tests were done through starch, formalin, cane sugar and colouring agents as follows.

2.2.2. Organoleptic Evaluation

a) Color: The judging of color was done by eye for organoleptic test. Color of milk is a blend of individual effects produced by Carotene, which imparts a yellowish color.

b) Flavor: Flavor may be detected by sniffing the products before placing in the mouth and also while in the mouth.

c) Taste: The sample was placed in the mouth, rolled around in the mouth to come in contact with the taste buds located on the various portion of the tongue.

d) Texture: The judging of texture of milk sample was also done by eye.

2.2.3. Chemical Tests

a) Determination of acidity: Acidity of all milk samples were determined as per method described by [25].

b) Determination of fat: Fat test was done by Babcock fat test methods.

c) Determination of protein: Protein percentage is calculated by the formal titration method described by Hasan and Rakib [1].

d) Determination of lactose: The lactose content was estimated by the following formula: Lactose content of milk = SNF% - (Protein% + Ash %).

e) Determination of ash: Details of the test are given in Appendix I section. Ash content was determined as per method by WM Clunie Harvey and Harry Hill [27].

f) Determination of total solids (TS): Details of the test are given in Appendix I section. TS of all milk samples were determined as per method described by WM Clunie Harvey and Harry Hill [27]. Solids-not-fat (SNF) was also determined [25].

g) Specific gravity: Specific gravity test was performed by using Quevenne Lactometer, according to the method described by [25].

2.2.4. Microbiological Tests and Statistical Analysis

The experimental procedures were followed for the determination of the number of total viable bacteria in a sample and the detection and enumeration of coliform bacteria as per recommendation American Public Health Association [28]. Data were analyzed statistically by using MSTATC package in one-way analysis of variance test as per Completely Randomized Design (CRD). For ranking the means Least Significance Difference (LSD) test was used.

3. Results and Discussion

In this experiment, milk samples collected from three local markets of Jamalpur town i.e. from Narikali Bazar (A), Sofir Mia Bazar (B), and Sokal Bazar (C) were analysed to detect adulteration and monitor their quality [29]. Results obtained from this experiment are discussed below:

3.1. Tests for Adulteration

3.1.1. Starch Test

The results for starch test of milk samples collected from local markets of Jamalpur Upazila showed negative results. Akirul [30] showed negative results of starch test for all the samples collected from Muktagacha Upazila of Mymensingh District. Rashedul [31] also found the negative results of starch test for all milk samples collected from Fulbaria Upazila, Mymensingh. Lateef et al. [32] reported that Milk dealers maximize their profit margin by dilution and extraction of valuable milk fat which is removed as cream and increasing total solids content up to a level which is acceptable by the consumers with the addition of cheap substance like starch [33].

3.1.2. Formalin Test

The results for formalin test of collected milk samples showed negative results. Safi [34] found the negative results formalin test for all the collected milk samples of Mymensingh, Bangladesh. Rashedul [31] also reported the negative results of formalin test for all milk samples collected from Mymensingh, Bangladesh.

3.1.3. Cane Sugar Test

The results for cane sugar test of all milk samples showed negative results. Pal et al. [35] reported that added sugar in milk is a very common adulteration problem in dairy industry [29] and the SNF content in milk is increased by the addition of sugar and only 0.2% addition increase lactometer reading by one degree of 60°F. Zia [36] observed that cane sugar is added in milk to increase solids-not-fat content of milk after addition of water.

3.1.4. Test for Coloring Agent

All the milk samples showed negative results in case of coloring agent. Akirul [30] showed negative results of coloring agent for all the samples collected from Mymensingh, Bangladesh.

Table 1. Adulteration test results of collected raw milk samples

Items	Narikali Bazar	Sofir Mia Bazar	Sokal Bazar
Starch	Negative	Negative	Negative
Formalin	Negative	Negative	Negative
Cane sugar	Negative	Negative	Negative
Colouring Agents	Negative	Negative	Negative

3.2. Physical Parameters

The physical parameters were measured after collection of milk from local markets of Jamalpur, Bangladesh (Table 1). These parameters were mainly organoleptic test (colour, flavour, taste, texture) and specific gravity of the raw milk samples [37].

3.2.1. Colour

All the raw milk samples collected from local markets of Jamalpur Sadar were yellowish white in color. Most of the samples agree with Rashedul [31] who reported that

the color of the milk sample collected from Fulbaria market were yellowish white in color. Monem [38] showed the color of most of the milk samples of Bogra town were yellowish white.

3.2.2. Flavor

All the collected milk samples were normal in flavor. This result agreed with the work of Bari [39] who showed that the milk flavor was normal (pleasant and aromatic) collected from dairy farm of Bangladesh Agricultural University, Mymensingh, Bangladesh.

3.2.3. Taste

The taste of all milk samples was normal. Bari [39] showed that normal taste of milk collected from BAU Dairy Farm in where milking had been done hygienically. Safi [34] found the taste of all milk samples collected from local markets of Mymensingh, Bangladesh were slightly sweet in taste. Rashedul [31] also reported slightly sweet in taste for all milk samples of Mymensingh, Bangladesh.

3.2.4. Texture

The texture of raw milk sample was examined when milk was bought. All samples were normal texture (Free flowing fluid). Rashedul [31] found the texture of raw milk sample were normal. Safi [34] also found normal texture for all milk samples. From the above results it may be said that the physical quality of raw milk collected three local markets of Jamalpur in Bangladesh were almost similar with a few variations in terms of physical qualities.

3.3. Chemical Parameters

The results of the experiment for chemical parameters of total solids (g/kg) raw milk samples such as specific gravity, acidity%, fat (g/kg), protein (g/kg), lactose (g/kg), ash (g/kg), total solids (g/kg), solids-not-fat (g/kg) are shown in the Table 2.

3.3.1. Specific Gravity

Specific gravity of sample A, B and C were 1.028±0.00, 1.027±0.00, and1.027±0.00 respectively (Table 2). Statistically it was found that there was no significant difference within the specific gravity of different milk samples. It was observed that specific gravity of milk obtained from Narikali Bazar was higher than milk of another Bazar. Islam et al. [20] who found that specific gravity of cow's milk from BAU Dairy Farm was higher than that collected from the local markers. In another experiment, Salam [40] reported that the average specific gravity of milk of Bhaghabarighat Dairy Plant was 1.027 ± 0.00. Rahman [41] studied the physical and chemical quality of milk collected from different plants of Milk Vita and also reported the average specific gravity of the milk of Bhaghabari Dairy Plant was 1.023 ± 0.00. Mahedi [42] reported that the average specific gravity of milk collected from Mymensingh town was 1.024±0.02. Monem [38] found the average specific gravity of milk collected from Bogra town was 1.026±0.06. Milk fat has some influence on the specific gravity of milk. Specific gravity mostly depends on the TS content and increases when the TS content rises.

3.3.2. Acidity Percentage

Average acidity of milk samples is shown in Table 2. From the table, it is found that acidity percentage of sample A, B and C were 0.15±0.00, 0.16±0.01 and 0.16±0.01 respectively. Statistical analysis showed that there was no significant difference within the acidity percentage of milk collected from local markets. Acidity percentage of milk sample of Sofir Mia Bazar was higher than another Bazar. Asaduzzaman [43] reported the average percentage of acidity of milk available at Mymensingh district of Bangladesh was 0.15±0.00. In another experiment, Mahedi [42] also found the average percentage of acidity of milk at Mymensingh town of Bangladesh was 0.15±0.00. Higher percentage of acidity in milk may be due to microbial activities or enzymatic reaction [44]. Besides, acidity of milk collected from the markets depends sometimes on the time required from milking up to receiving milk in the laboratory. The higher content of SNF in milk may show slightly higher percentage of acidity and lower contents shows lower acidity of milk. From the normal acidity value of milk obtained from three markets, it may be said that all the milk samples were fresh during experiment on laboratory.

3.3.3. Fat content

Fat content of sample A, B and C were 37.50±0.50, 38.66±0.29, and 38.88±0.29 respectively (Table 2). Statistically it was found that there was significant difference within the fat content of different milk samples [45]. In this experiment highest value of fat was obtained from the milk of Sokal Bazar than other sources. According to the proposed standard of BSTI-(2002) the average fat content of milk is 35g/kg. Asaduzzaman [43] found that milk sample collected from BAU Dairy farm had higher fat content than that of market samples was 44.35gm/kg. Safi [34] found the average fat content of milk available at Mymensingh town of Bangladesh was 31.5gm/kg [25].

3.3.4. Protein content

Average protein content of milk samples is shown in Table 2. From the Table, it is found that protein content of sample A, B and C were 35.86±0.85, 36.93±1.50 and 37.16±1.04 respectively. Statistical analysis showed that there was no significant difference ($p<0.01$) within the protein content of different milk samples [46]. The average protein content was higher in Sokal Bazar compared to other. This might be due to genotypic variation and nutritional level of cows.

Table 2. Summary of the results (mean ± SD) of physical parameters of raw milk samples

Parameter and sample number	Narikali Bazar	Sofir Mia Bazar	Sokal Bazar	Level of Significance
Flavor (45)	41.33±1.15	40.33±0.58	42.00±1.00	Non-significant
Appearance (5)	3.33±0.58	3.00±1.00	3.66±0.58	Non-significant

Table 3. Summary of the results (mean ± SD) of chemical parameters of raw milk

Parameters	Narikali Bazar	Sofir Mia Bazar	Sokal Bazar	Level of significance
Specific gravity	1.028±0.00	1.027±0.00	1.027±0.00	NS
Acidity (%)	0.15±0.00	0.16±0.01	0.16±0.01	NS
Fat (g/kg	37.50b±0.50	38.66a±0.29	38.83a±0.29	**
Protein (g/kg)	35.86± 0.85	36.93±1.50	37.16±1.04	NS
Lactose (g/kg)	42.70±0.96	42.43±2.93	44.66±1.76	NS
Ash (g/kg)	6.66±0.21	7.23±0.93	6.83±0.58	NS
TS (g/kg)	122.73±0.91	125.26±5.33	127.50±1.80	NS
SNF (g/kg)	85.23±2.33	86.60±5.05	86.66±1.76	NS

a,b,c In a row figures with same superscription do not differ significantly whereas figures with dissimilar superscription(a, b, c) differ significantly: **P<0.01, NS=Non-significant.

3.3.5. Lactose Content

Lactose content of sample A, B and C were 42.70±0.96, 42.43±2.93, and 44.66±1.76 respectively (Table 2). Result showed that there was no significant difference within the lactose content of different milk samples [1]. Milk sample of Sokal Bazar designated by C resume more lactose compared to other sources. Mahedi [42] revealed that lactose content in milk collected from different sweetmeat shops in Mymensingh town of Bangladesh was 39.13±3.2, 39.05±2.05, and 38.61±3.61 g/kg respectively [21]. So, the finding of the results in this study were higher [46].

3.3.6. Ash Content

Average ash content of milk samples is shown in Table 2. From the Table it is found that ash content of sample A, B and C were 6.66±0.21, 7.23±0.93, and 6.83±0.58 respectively. The ash content of different of milk samples had no significant difference. The percentage of ash in cow's milk collected from mid lactation was 0.75% [46]. From the present study it was observed that ash content of milk that ash content of milk sample of Sofir Mia Bazar almost meets the standard value and lower value in case of Narikali Bazar and Sokal Bazar.

3.3.7. Total Solids (TS) Content

Average total solids (TS) content of milk samples were 122.73±0.91, 125.26±5.33 and 127.50±1.80 respectively. The TS content of milk collected from local markets of Jamalpur Sadar, and Sokal Bazar had higher total solids content than other sources. Total solids content of milk collected by Rahman [41] from Manikgonj Chilling Centre, Tangail Chilling Centre, Takerhat Pasteurization Plant and Bagliabari. Dairy Plant was 11.49, 10.78, 10.72 and 12.91 %, respectively.

3.3.8. SNF Content

SNF content of sample A, B and C was 85.23±2.33, 86.60±5.05 and 86.66±1.76 respectively (Table 2). The SNF content of milk samples had no significant difference. Islam et al. [20] also reported lower SNF contents in local market milk than that of the milk from BAU Dairy Farm, Mymensingh. Hossain (1968) experimented that the average solids-not-fat percentage of milk of local nondescript cows was 8.91 ± 0.256%. Rahman [41] reported that the average SNF content of mixed milk collected from different primary co-operative society under Baghabari Dairy Plant was 7.69%. Mahedi [42] found the average SNF percentage of raw milk of Mymensingh town was 7.7

3.4. Microbiological Test

3.4.1. Total Viable Bacterial Count

The average values of total viable count of sample A, B, C were 8.3±1.25×105, 10.0±1.0×105, 7.6±0.76×105. Total viable bacteria count per ml of raw milk collected from local had no significant difference. Average total viable counts/ml for "Grade A" raw milk is not exceeding 200000 for milk to be pasteurized. From this study, it was found that the raw milk collected from local markets were not "Grade A" category in term of total viable bacterial count. In this experiment, comparatively higher viable bacterial count in B may be due to poor hygienic milking and utensils [46]. On the other hand, total viable count collected form C was slightly lower that might be due to maintaining proper hygienic condition. High bacterial density of above mentioned three local markets milk might be due to unhygienic milking and handling. Monem [38] showed that the total viable bacterial count of Bogra town range from 10×105 to 19×105. So, the finding of the results in this study were lower.

3.4.2. Coliform Count

The average values of coliform counts of sample A, B and C were 63.33±15.28, 70.00±20.00 and 60.00±10.00 CFU/ml respectively. The coliform counts/ml of different milk samples had no significant difference and the coliform counts/ml of milk samples were slightly higher. This may be due to poor hygienic milking, improper cleaning of dairy utensils and unhygienic handling during marketing of raw milk. Some toxin producing strains such as Escherichia coli O157:H7 can cause severe hemorrhagic diarrhea in humans and have been occasionally isolated from BTM [46]. Coliform Count (CC) is a nonregulated test that has been used historically to assess milk production practices such as milk refrigeration, milking machine sanitation, and premilking udder hygiene. Coliform count is a practical indicator of milking hygiene because it is easy and inexpensive to perform, and it is often correlated with the population of other bacteria in BTM [47]. Rashedul [31] reported that coliform count of raw milk samples of Fulbaria Upazila in Mymensingh District ranges from 70 to 120.

Table 4. Average total viable count (TVC) and coliform count of bacteria in raw milk samples

Parameter	Narikali Bazar	Sofir Mia Bazar	Sokal Bazar	Level of significance
Total viable count CFU/ml	8.3±1.25×105	10.0±1.0×105	7.6±0.76×105	Non-significant
Coliform count CFU/ml	63.33±15.28	70.00±20.00	60.00±10.00	Non-significant

4. Conclusion

The research was aimed to determine the adulteration and evaluate the quality (physical, chemical and microbiological) of raw milk samples collected from three selected markets of Jamalpur Sadar of Bangladesh. Total 27 milk samples were collected from three markets taking 9 samples from Narikali Bazar, 9 samples from Sofir Mia Bazar, and 9 samples from Sokal Bazar. This study revealed from chemical parameters that milk samples of Narikali, Sofir Mia and Sokal Bazar had mean acidity (0.15±0.00, 0.16±0.01, 0.16±0.01); fat (37.50±0.50, 38.66±0.29, 38.83±0.29 g/kg); protein (35.86±0.85, 36.93±1.50, 37.16±1.04 g/kg); lactose (42.70±0.96, 42.23±2.93, 44.66±1.76 g/kg); ash (6.66±0.21, 7.23±0.93, 6.83±0.58 g/kg); TS (122.73±0.91, 125.26±5.33, 127.50±1.80 g/kg); SNF (85.23±2.33, 86.60±5.05, 86.66±1.76 g/kg); specific gravity 1.028±0.00, 1.027±0.00 and 1.027±0.00 respectively. It further found that the milk samples of local markets showed significant differences in case of fat content and there were no significant differences in case of other parameters among three markets. However, in adulteration test, all of the test results were negative. There was no adulteration in obtaining milk sample, though there was fluctuation in parameters (fat, protein, ash, lactose) regarding the standard value. It was visualized after inspection that all the market samples were yellowish white in color, normal in taste and flavor and free flowing fluid in case of texture. The specific gravity of all raw milk samples was more or less similar. From the overall experiment, it can be concluded that Milk collected from Sokal Bazar milk was superior in case of Fat, Protein and Lactose content than any other markets of collected milk sample. Yet, for the production of "better quality milk" it is necessary to train farmers about the hygienic aspects of milk production and marketing. Person should be honest who is involved in milk marketing as well as Dairy industry for ensuring safe consumption of milk to the consumers.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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