International Journal of Agriculture and Environmental Research

ISSN: 2455-6939

Volume:03, Issue:04 "July-August 2017"

PHYSICO CHEMICAL ANALYSIS OF MILK AND TO CHECK THE SHELF LIFE OF MILK IN GILGIT CITY THROUGH MBRT TEST

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ABSTRACT

The Present study was carried out to investigate the quality of cow milk. And to investigate the occurrence and load of microorganisms in cow milk with special reference to methylene blue reduction test (MBRT). A total of 40 samples (5 from each source) were collected from 8 different areas of Gilgit city. Including Danyore, Nagral, Bagrote, Sakwar, Khomer, Jalalabad, Oshikhandas, and Nomal. The aim of this study is to investigate the occurrence and load of microorganisms in cow milk.A wide variation was observed in the quality of raw Cow milk and methylene blue reduction test. Specific gravity ranged between 1.0446 and 1.039, pH 6.36 and 5.75, and acidity 0.342 and 0.3), viscosity is 1.808 and 1.63. The methylene blue test was performed for raw milk samples revealed from Bagrote, Sakwar, Nomal, Oshikhandas, Jalalabad all the milk samples were poor while the samples collected from Danyore, Nagral, and khomer were fair. The pasteurized milk samples from all the villages were fair. It is well established that consumers want clean, wholesome and nutritious food that is produced and processed in a sound, sanitary manner and is free from pathogens. For fulfilling consumer's demand, quality milk production is necessary. Quality milk means, the milk which is free from pathogenic bacteria and harmful toxic substances, free from sediment and extraneous substances, of good flavor, with normal composition, adequate in keeping quality and low in bacterial counts.

Keywords: Physio Chemical, Milk, Analysis, Shelf Life

ISSN: 2455-6939

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INTRODUCTION

Milk is a basic source of all nutrients required for mammals including human beings (Hassan, 2005). The major chemical components of milk include water, fats, proteins, carbohydrates, minerals, organic acids, enzymes and vitamins (Rodriguez et al., 2000; Simsek et al., 2000). The composition of cow's milk an average of 3.8 % fat, 3.3% protein, 4.8% lactose, 0.7% ash, and 87.4% water, Milk also contains vitamins and other nutrients in small amounts, making it the most complete of foods. The young of mammalians survive on it exclusively. Cow have contributed greatly to human welfare, supplying draft power, milk, meat, hides, fuel and a variety of other products (Hodgson, 1979). Nutritionally enriched milk and milk products with enhanced biological potential without health risks are generally demanded (Khan and Zeb, 2007; Rahman et al., 2006). In the year 2007-2008, Pakistan produced 42.199 million tons of milk; of which 62.17% was contributed by buffaloes, 34.21% by cows and 3.60% collectively by sheep, goats and camels (Athar et al., 2003; Anonymous, 2008). In the year 2008-2009, Pakistan produced 43,562 million tons of milk; of which 62.04% was contributed by buffaloes, 34.39% by cows, 1.65% by goats, 0.08% by sheep and 1.83% by camels (Anonymous, 2009). The contents of 38 micro- and trace elements in raw milk of cows in the Silesian region, Poland, were studied by (Dobrzanski et al., 2005. The effect of temperature and storage time on nutritional quality of ultra-heat treatment (UHT) processed buffalo milk was reported by (Rehman and Salaria, 2005). They found that the nutritional quality of the milk was adversely affected with the increase in temperature and storage time (Hassanet al., 2009). The aim of this study was to check the quality of cow's milk, identify the contamination, determine physical and chemical parameters. Cow's milk collected from 8 different areas of Gilgit city.

METHODOLOGY

Samples were collected from eight different areas of Gilgit (Danyore, Nagral, Bagrote, Sakwar, Khomer, Jalalabad, Oshikhandas, and Nomal). All these samples were brought to the Food science and Technology laboratory. Physical analysis and methylene blue reduction test of 40 samples of Cow milk was carried out. The Methylene blue reduction test was based on the fact that the decolorization of milk by the addition of a dye such as Methylene blue will disappear more or less quickly. Physical analysis of milk samples was determined according to the method of Association of Official Analytical Chemists (AOAC, 1990). PH of the samples was measured by using digital PH meter A.O.A.C (1990). Specific gravity was determined according to the method of Association of Official Analytical Chemists (AOAC, 1990). Specific gravity of milk was determined by using pycnometer. Viscosity was determined according to the method of Association of Official Analytical Chemists (AOAC, 1990). Viscosity of milk was determined with viscometer at 20^{o}C). The viscosity of milk was calculated according to the following

ISSN: 2455-6939

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formula: Viscosity (cP) = Flow time of milk at 20oC × Specific gravity of milk ×1.002/flow time of water at 20°C.

RESULT AND DISCUSSIONS

The means of specific gravity of milk samples of Danyore, Nagral, Bagrote, Sakwar, Nomal, Jalalabad, Khomer, and Oshikhandas Were (1.04460), (1.0390), (1.0346), (1.0352), (1.0374), (1.0286), (1.0292) and (1.0246) respectively. The mean value of Danyore and Nagaral Sample have high specific gravity (1.04460) and (1.0390) respectively, as compared to other samples. Our results are completely agreement with Javaid et al. (2010) who showed the highest specific gravity (1.031 ± 0.001), from one source while the specific gravity of milk obtained from other source was significantly (P<0.001) lower (~1.026). These results are in agreed with the work of Shah, (1996) and Prasad, (1997). Asif Mahmood et al., (2010) also reported the same result specific gravity, 1.027-1.031 in cow milk.

Table 1: Mean values for Specific Gravity of milk in different areas of Gilgit City

S.NO	AREAS	A	B	C	D	E	MEAN
1	DANYORE	1.03	1.009	1.033	1.043	1.108	1.044
2	NAGRAL	1.038	1.038	1.031	1.049	1.039	1.039
3	BAGROTE	1.035	1.041	1.036	1.034	1.027	1.034
4	SAKWAR	1.031	1.037	1.037	1.037	1.034	1.035
5	JALALABAD	1.04	1.04	1.036	1.034	1.037	1.028
6	KHOMER	1.026	1.027	1.028	1.037	1.025	1.029
7	NOMAL	1.019	1.029	1.03	1.034	1.034	1.037
8	OSHIKHANDAS	1.031	1.023	1.026	1.016	1.027	1.024

The means of titrable acidity of milk samples of Danyore, Nagral, Bagrote, Sakwar, Nomal, Jalalabad , Khomer, and Oshikhandas were (0.39), (0.342), (0.318), (0.3), (0.36), (0.348), (0.318) and (0.3).The highest titrable acidity was found in Danyor and Jalalabad samples (0.39) and (0.36) respectively, while lowest in Sakwar and Oshikhandas normal in other areas. These results were in line with those reported by Ahmed (1990) and Elamin and Wilcox (1992) (i.e. 0.13 and 0.15%, respectively). Asif et al., (2010) Agree that titratble acidity of milk samples collected 0.14-0.19 % in cow milk.

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Table 2: Mean value forTitrable Acidity of cow milk in different areas of Gilgit city.

S.NO	AREAS	A	B	C	D	E	MEAN
1	DANYORE	0.33	0.48	0.45	0.42	0.27	0.39
2	NAGRAL	0.24	0.39	0.33	0.45	0.3	0.342
3	BAGROTE	0.21	0.45	0.3	0.33	0.3	0.318
4	SAKWAR	0.27	0.3	0.33	0.3	0.3	0.3
5	JALALABAD	0.39	0.21	0.24	0.42	0.33	0.36
6	KHOMER	0.45	0.39	0.36	0.3	0.3	0.348
7	NOMAL	0.39	0.27	0.33	0.36	0.39	0.318
8	OSHIKHANDAS	0.45	0.27	0.36	0.36	0.42	0.3

PH was observed in between the means values of PH, (5.80), (6.15), (6.03), (6.36), (5.99), (5.75), (5.93), (5.81). PH Value was highest in sakwar and nagral sample (6.36) and (6.15) respectively,and lowest in Danyore and Jalalabad milk samples during the research.. while higher than those of reported by Ahmed (1990) and (1984) (i.e. 6.53 & 6.49, respectively,) Relatively similar observations were made by different workers (Memon,2000) pH of milk samples collected from different species was determined at the time of sampling. Asif et al., 2010 agreement that pH values were in cow milk, 6.48-6.64 were in accordance with the findings of Braun and Stefanie (2008), Kanwal et al., (2004) and Imran et al., (2008). pH values found in cow milk were in agreement with the findings Kanwal et al. (2004) and Enb et al. (2009).

Table 3: Mean value for PH of cow milk in different areas of Gilgit City.

S.NO	**AREAS**	**A**	**B**	**C**	**D**	**E**	**MEAN**
1	DANYORE	5.63	5.43	6.54	6.77	4.65	5.80
2	NAGRAL	5.68	6.91	5.07	6.62	6.49	6.15
3	BAGROTE	5.85	6.20	6.23	5.80	6.09	6.03
4	SAKWAR	6,06	5.91	6.68	6.49	6.66	6.36
5	JALAL ABAD	5.68	6.75	5.88	6.38	5.28	5.75
6	KHOMER	5.49	4.90	6.52	6.04	5.84	5.93
7	NOMAL	5.46	6.75	5.76	6.76	4.95	5.99
8	OSHIKHANDAS	4.81	6.67	5.49	6.66	5.42	5.81

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The above Table 4 showed that highest viscosity was found in Jalalabad sampes (1.80) as compaired to other samples. Javaid et al., (2010) were agreed that Viscosity of milk in the study varied between 1.61 and 2.10 centipoises (cP) with an overall average of 1.86 ± 0.02 cP. These results are similar with the study conducted by (Prasad, 1997). This can be attributed to temperature and period of storage of milk and/or water adulteration.

Table 4: Mean value for Viscosity of Cow's milk in different areas of Gilgit.

S.NO	AREAS	A	B	C	D	E	MEAN
1	DANYORE	1.70	1.76	1.62	1.74	1.74	1.71
2	NAGRAL	1.68	1.71	1.62	1.62	1.52	1.63
3	BAGROTE	1.99	1.51	1.85	2.01	1.60	1.79
4	SAKWAR	1.64	1.90	1.82	1.77	1.46	1.71
5	JALAL ABAD	2.60	1.70	1.49	1.73	1.52	1.80
6	KHOMER	1.67	1.45	1.36	1.45	1.44	1.47
7	NOMAL	1.95	1.87	1.74	1.68	1.56	1.76
8	OSHIKHANDAS	1.67	1.98	1.54	1.39	1.85	1.68

The methylene blue reduction test performed for raw milk five samples processed from Danyore three samples were fair and two were fair while pasteurized milk samples all the samples were good (Table 5).

Table 5: Methylene Blue Reduction Test performed in Danyore samples.

RAW MILK				PASTEURIZE MILK	
S.NO	SAMPLE	DECOLOURIZATION TIME	GRADE	DECOLOURIZATION TIME	GRADE
1	A	30 MINTS	POOR	6:00 hrs	GOOD
2	B	30 MINTS	POOR	6:30 hrs	GOOD
3	C	2:00 hrs	FAIR	6:30 hrs	GOOD
4	D	2:30 hrs	FAIR	7:00 hrs	GOOD
5	E	3:00 hrs	FAIR	7:00 hrs	GOOD

In Nagaral five samples three samples were poor and two were fair in pasteurized milk all the samples were good.

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Table 6: Methylene Blue Reduction Test performed in Nagral samples.

RAW MILK				PASTEURIZE MILK	
S.NO	SAMPLE	DECOLOURIZATION TIME	GRADE	DECOLOURIZATION TIME	GRADE
1	A	3:00 hrs	FAIR	7:00 hrs	GOOD
2	B	30 MINTS	POOR	6: 00 hrs	GOOD
3	C	3:30 hrs	FAIR	7:00 hrs	GOOD
4	D	30 MINTS	POOR	6:30 hrs	GOOD
5	E	1:30 hrs	POOR	6:30 hrs	GOOD

Five samples processed from Bagrote four were poor and only one sample was poor in pasteurized milk four samples were fair except one sample was good.

Table 7: Methylene Blue Reduction Test performed in Bagrote samples.

RAW MILK				PASTEURIZE MILK	
S.NO	SAMPLE	DECOLOURIZATION TIME	GRADE	DECOLOURIZATION TIME	GRADE
1	A	4:00 hrs	FAIR	6:30 hrs	GOOD
2	B	2:00 hrs	POOR	5:30 hrs	FAIR
3	C	1:00 hrs	POOR	6:00 hrs	FAIR
4	D	30 MINTS	POOR	4:30 hrs	FAIR
5	E	1:30 hrs	POOR	5:00 hrs	FAIR

In Jalalabad four samples were poor except one was fair and all pasteurized samples were fair.

Table 8: Methylene Blue Reduction Test performed in Jalalabad samples.

RAW MILK				PASTEURIZE MILK	
S.NO	SAMPLE	DECOLOURIZATION TIME	GRADE	DECOLOURIZATION TIME	GRADE
1	A	2:00 hrs	POOR	6:00 hrs	FAIR
2	B	2:00 hrs	POOR	5:00 hrs	FAIR
3	C	1:30 hrs	POOR	4:30 hrs	FAIR
4	D	1:00 hrs	POOR	5:30 hrs	FAIR
5	E	2:30hrs	FAIR	6:00 hrs	FAIR

METHYLENE BLUE REDUCTION TEST

The methylene blue reduction test performed for raw milk samples processed from Danyore, Nagaral, Bagrote, Nomal, khomer, Sakwar, Jalalabad, and Osikhandas as shown in table 5,6,7,8.

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All the samples were poor except three samples from Danyore and two from Nagral were fair and all the milk samples processed from khomer were fair. While pasteurized milk all samples were fair except samples from Danyore, Nagral, and Khomer were good.Our results are completely agreement with (Ahmed et al.,2009)who shows that most of the samples processed from Basin, Barmas and Nagral were poor except two samples from Nagral were fair, while the milk samples from kashrote were excellent. All the samples of the pasteurized milk samples were good and kashrote samples were excellent. Sakwar, Bagrote, Oshikandas, Jalalabad, Nomal are situated in the periphery of Gilgit where livestock are kept in cattle sheds and open channel water is used for cleaning of cow udder, teats and hands before milking the cows. Danyore, Nagral and khomer, on the other hand, is situated in the middle of the city and people kept only a single cow and use drinking tap water for washing the utensils, hands and teats of the cow during milking. There is therefore less contamination in these milk samples. Grewal and Tiwari (1992) also agree that the sources of contamination of raw milk are the uncleaned hands of milking person, poor quality of water used for washing the milking utensils, udder of the cow and uncleand teats could be the source of accelerating the bacterial contamination of raw milk and raw milk products.

CONCLUSION

Overall the situations of the milk in selected areas are satisfactory. The quality of milk is good in those areas where people use drinking tap water for washing the utensils, hands and teats of the cow during milking. Therefore there is less contamination in these milk samples. Contamination of milk may be enhanced due to uncleaned hand while milking.

AKNOWLEDGEMENT

The writes thanks to Karakoram International University for providing funding and special thanks to his supervisor for guidance and support.

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