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Study on total bacteria count of raw milk produced in the farm of the college of Veterinary Medicine and Animal Production - Sudan University of Science and Technology

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A B S T R A C T

This study was conducted to determine the total count of bacteria in the raw milk produced in the farm of the College of Veterinary Medicine and Animal Production, Sudan University of Science and Technology, and accordingly bacterial contamination of the milk and its suitability for consumption. Sixty samples of bulk raw milk were collected, 30 from morning milk and 30 from evening milk and then subjected to laboratory tests. The data obtained was then compared with the different standards given for the total bacteria count in milk. According to the results obtained the produced farm milk is satisfactory and acceptable for consumption with a total bacterial count of an average 650.000 cell per 1ml of milk. The statistical analysis showed no significance variation in the total count of bacteria between morning and evening milk (650.000 ± 14002.3 and 651.000 ± 98443.1) respectively.

Introduction

Milk is legally defined as the normal secretions of the mammary gland of mammals (Clarence.et.al.2004). Normal milk consist of about 13 to 14 percent total solids, 86 to 87 percent water and 3 to 6 percent fat. Good milk has rich flavor and very little odor. It must not appear dirty, discolored or watered down and must be free of diseases (Thomas 1980).

Milk can also be defined as the original milk of one or more cows, which has not been heated to more than 40°C, and has not been submitted to any kinds of treatment (Edddgar and Axel 1995). It is obtained by simple or multiple milking of cows that are kept for the purpose of milk production (Eddgar and Axel, 1995). Milk is a good source of nutrients and edible energy

(Femema.*et.al.* 1985), it is a white liquid but it can be slightly yellowish, especially during the summer when the cows are out in the meadow. It is supposed to have a typical clean smell and its consistency is homogeneous (Eddgar and Axel, 1995).

Clarence.*et.al.*(2004) pointed out that bacteria are found nearly every where in the nature and they are prevalent where organic mater is available as a source of nourishment and found in large numbers in soil, decaying plant or animals substances where by some are present in the air and water. According to Payne (1990), fresh drawn milk contains few bacteria.

Milk is sterile when secreted from the udder (Tolle, 1980) , but it may be contaminated with the different bacteria present on the cow and it's environment including contaminated water used to clean the milking system Barmley and Mckinnon (1990). Eddgar and Axel (1995) stated that good milk quality is the basic for the production of high quality product. As given by Henderson (1971) Milk is excellent food especially for growing children, and is regarded as the only food that provides a well-balanced essential nutrients in a form of which is palatable, digestible and sanitary (Kordylas, 1991). Fresh whole milk is a valuable source of vitamin A, Riboflavin, Thiamin and other B vitamins and it is important source of vitamin C , conjugated linolenic acid and butyric acid and it has been an important part of the human diet as far back as 6000 years ago (Payne, 1990).

Materials and Methods

Samples Collection

Sixty samples of fresh raw milk were randomly collected from the farm (Thirty

from the morning milk and thirty from the evening milk) during the period 19th January to 19th February 2009. Method applied for milking in the farm are both hand and machine milking. The raw milk then mixed together forming the bulk milk.

Method

The Samples were subjected to laboratory test by using Direct Microscopic Count, according to (Elsharifi and El Sayed (1992).

Statistical analysis

The Obtained data were analyzed statistically by using T-Student test.(T-test), according to Gomez and Gomez (1984)

Result and Discussion

Table 1 and 2 explains the results of the total bacteria counts for Morning and evening milk respectively:

Statistical Results

The total average of bacteria for both morning and evening milk (650.000) cfu/ml of milk.

The results obtained showed a total average of 650.000 bacteria cell per 1 ml milk for cow's milk. Hence the milk quality may be considered as satisfactory according to the standard given by Elsharifi and El Sayed (1992), who indicated that the satisfactory milk has a total bacteria count ranging between 250.000- 1000.000 bacteria cells per 1ml. The results obtained are also in accordance with that given by John and Robert (1975), Chamdan and Hedirk (1979) and Payene (1990), who gave a total number of bacteria cell of 500.000-1000.000 per 1ml milk. But the results obtained contradicts the standards given by Sudanese's Standards and Metrology

Table.1 results of the total bacteria count for morning milk and its evaluation

Samples	Number of Bacteria per 1ml milk				Evaluation
	R1	R2	R3	average	
1	560000	520000	580000	553000	Satisfactory
2	460000	540000	600000	533000	Satisfactory
3	1080000	110000	108000	1086000	Bad
4	460000	500000	540000	500000	Satisfactory
5	660000	540000	560000	586000	Satisfactory
6	480000	620000	640000	580000	Satisfactory
7	640000	960000	700000	766000	Satisfactory
8	760000	800000	760000	773000	Satisfactory
9	620000	600000	580000	600000	Satisfactory
10	780000	1040000	1280000	1033000	Bad
11	640000	600000	640000	626000	Satisfactory
12	720000	660000	640000	673000	Satisfactory
13	400000	420000	520000	446000	Satisfactory
14	480000	560000	500000	513000	Satisfactory
15	580000	580000	640000	600000	Satisfactory
16	720000	700000	760000	726000	Satisfactory
17	800000	700000	740000	746000	Satisfactory
18	560000	620000	520000	566000	Satisfactory
19	560000	620000	580000	586000	Satisfactory
20	680000	600000	660000	646000	Satisfactory
21	600000	580000	560000	580000	Satisfactory
22	800000	820000	640000	753000	Satisfactory
23	740000	600000	660000	666000	Satisfactory
24	720000	680000	640000	680000	Satisfactory
25	560000	520000	430000	503000	Satisfactory
26	430000	540000	760000	576000	Satisfactory
27	620000	640000	580000	613000	Satisfactory
28	640000	600000	560000	600000	Satisfactory
29	740000	680000	580000	666000	Satisfactory
30	800000	760000	660000	740000	Satisfactory

-R1= Replicate 1

-R2= Replicate 2

-R3= Replicate 3

-Less Than 100.000=Very Good, 100.000 to 250.000=Good, 250.000 to 1.000.000=Satisfactory, 1000.000 to 5.000.000 =Bad, More Than 5.000.000 =Very Bad.

-The total average of bacteria count for morning milk (650.000) cfu/ml of milk.

Table.2 results of the total bacteria count for evening milk and its evaluation

Samples	Number of bacteria per 1ml milk				Evaluation
	R1	R2	R3	Average	
1	660000	600000	620000	626000	Satisfactory
2	520000	560000	500000	526000	Satisfactory
3	480000	520000	540000	513000	Satisfactory
4	660000	680000	580000	640000	Satisfactory
5	600000	660000	760000	673000	Satisfactory
6	820000	720000	1200000	913000	Satisfactory
7	540000	580000	560000	560000	Satisfactory
8	640000	580000	620000	613000	Satisfactory
9	700000	580000	520000	600000	Satisfactory
10	720000	730000	700000	716000	Satisfactory
11	640000	660000	630000	643000	Satisfactory
12	480000	520000	560000	520000	Satisfactory
13	500000	640000	510000	550000	Satisfactory
14	580000	600000	520000	566000	Satisfactory
15	980000	620000	720000	773000	Satisfactory
16	900000	660000	760000	773000	Satisfactory
17	720000	700000	730000	716000	Satisfactory
18	490000	600000	640000	576000	Satisfactory
19	600000	580000	620000	600000	Satisfactory
20	880000	840000	680000	800000	Satisfactory
21	600000	620000	610000	610000	Satisfactory
22	860000	820000	720000	800000	Satisfactory
23	660000	640000	630000	643000	Satisfactory
24	700000	520000	710000	643000	Satisfactory
25	610000	630000	710000	650000	Satisfactory
26	830000	900000	610000	780000	Satisfactory
27	660000	600000	620000	626000	Satisfactory
28	800000	780000	600000	726000	Satisfactory
29	720000	600000	610000	643000	Satisfactory
30	470000	510000	620000	533000	Satisfactory

-R1= Replicate Number 1

-R2= Replicate Number 2

-R3= Replicate Number 3

- Less Than 100.000=Very Good, 100.000 to 250.000=Good, 250.000 to 1.000.000=Satisfactory , 1000.000 to 5.000.000 =Bad , More Than 5.000.000 =Very Bad.

-The total average of bacteria for the evening milk (651.000) cfu/ml of milk.

Table.3 Bacteria Count for morning and Evening Milk

Milking time	Bacteria Count
Morning Milk	650.000 ± 14002.3
Evening Milk	651.000 ± 98443.1
Levels of Significance	NS

-Values are measure ± Standard deviation of 30 samples for each milking time.

-Ns = Not significant

Organization (2007), which stated that the total number of bacteria in raw milk should not exceed more than 500.000 cell per 1ml milk and Also El Kholi (1999) pointed out that the total number of bacteria for satisfactory milk should be within the range 400.000- 500.000 bacteria per 1ml milk. The same statement is also given by William and Paul (1973) and Thoma (1980). In this case the raw milk produced in the college farm is not satisfactory.

According to El Higravi *et.al.* (1974) when the number of bacteria in the raw milk ranges between 500.000-1000.000 cell per 1ml milk , the raw milk in this case is considered of bad quality . Hence the raw milk produce in the farm may be considered of bad quality.

The College Farm milk does not reach the standards of good to very good. This may be related to many factors associated with the methods of production and handling of the milk. Hand and machine milking are both practiced in the college farm. The bulk milk collected is then mixed together .This procedure may cause a rise in the total bacteria count, since hand milking contributes to raise the bacteria count. Production of clean and healthy milk depends on clean udder and milkers hands and bodies as stated by Farag (1985). It

also noticed that the milk utensils are not cleaned and disinfected properly. According to Nour (1993) , the milk containers add either high or low bacteria to milk after milking till it reaches the consumers.

A major factor for the high number of bacteria in the raw milk produced in the farm is related to the treatment of the milk whereby the milk is not cooled after milking. Cooling of the milk is essential for inhibiting growth of bacteria. The environment of the milk sheds is not clean due to the presence of dung and fodder residues. These may be good sources of bacteria as noticed by Sagar and Antwan (1991). Hence contamination of the milk with bacteria from this source may be expected. Its also notice that the dairy farm is located near the poultry farm which may increase the bacteria load in the milk through the air and it could possibly be one of the major sources of milk contamination.

The above mentioned factors contribute a lot to the increase of the total number of bacteria in the milk produced. In order to reach the standards of good to very good for milk the effects of these factors should be minimized to the lowest, since the growth of bacteria and subsequently the milk quality depend on it.

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