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Evaluation of the bacteriological quality of milk cow in dairy Beni Tamou (Blida) Algeria

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Abstract
Our work consists in following the microbiological quality control of unpasteurized milk during three months. During this period of evaluation, we noticed that the microbiological quality is rather inferior, this result (profit) translates by the proliferation of pathogenic germs and the presence repetitive of certain *staphylococcus aureus* origins (stumps) and the faecal streptococci of a rate of 95 germs / ml in the temperature of 37°C due to the bad conditions of hygiene and the contamination of the equipments which serving has the manipulation of the line (feature). We also note the presence of the other microorganisms as: the aerobic germs total mésophiles in 30°C with a rate of 90671 UFC / ml, faecal coliformes in 44°C at a rate of 176 UFC / ml and *clostridiums* sulfito_reducteurs in 46°C but in the threshold with 02 colonies / ml. The microbiological analyses showed that the microbial load (responsibility) in samples is variable according to the sanitary conditions.

1. Introduction

In Algeria, the import of milk powder increased in recent times, due to population growth and inadequate domestic production. While a significant effort is made to stem the importation by encouraging the development of dairy cattle, it is not the same with other productions from dairy species such as goats, sheep, and camels that are particularly suited our harsh agro-climatic conditions and hardiness which is always appreciated.

Since the 1970s, a succession of dairy plans to boost milk production, was adopted. However, once confronted with the realities on the ground, these plans could not produce the expected results. The causes of this failure are related to the lack of an overall vision on production systems, and ignorance of the actual conditions of farms, lack of data on their structure and their functioning. However, perfect knowledge of farming conditions, is a prerequisite to any action to improve the situation.

The commodity in the consumption of milk is Algerian, it occupies an important place in the diet of everyone, regardless of income, rich in nutrients, milk can supplement other expensive products, such meat. Indeed, one gram of protein from milk, costs eight times cheaper than the same amount from the meat. Energy term, calorie obtained from meat, is twenty times more expensive than from milk [1].

Algerian dairy taken directly from livestock (mainly cattle) is estimated at 1.38

million tonnes for the year 2000 [2].

The coverage of milk needs of the Algerian population, from the only domestic production (raw milk collected and uncollected), does not exceed 40%. This rate has not changed over the past three years.

This deficit can be explained by:

• Poor organization and lack of coordination between the collectors and producers.

• The low investment actions taken by the industry in the area of collection.

• The wide dispersion of the majority of producers and their low production costs resulting collection often prohibitive.

• The constraints of material and human order: the dilapidated park equipment, lack of means of refrigeration on the farm, with instability of biochemical and bacteriological quality of milk, and non-compliance with hygiene standards by farmers and delivery drivers [3].

Milk during milking, transport and storage in the farm or factory undergoes changes. And to elucidate this issue was articulated in our work:

The appreciation of the hygienic quality of raw milk from cows "BENI TAMOU" complex by microbiological analyzes that aim to:

- The quality assessment of raw milk and the identification of plant contamination.
- The Assessment of the hygienic quality of raw milk.

2. Material and Methods

2.1. Study Site

The study was conducted in the dairy complex BENI TAMOU located in Blida, for a period of three months (15/01/2014 to 04/15/2014).

2.2. Sampling

Milk from 300 dairy cows.

The milk samples were stored at 4 ° C and immediately transported to the laboratory where they are analyzed. On arrival, the measurement of pH, acidity are made. Milk samples were collected from tank located at the milking parlor.

Once the deals done, the milk is brought in tanks at the unit hours between 15h and 16h in a room complying with strict conditions to ensure the proper conduct of the work. Milk received will be study deals with the control of the bacteriological quality throughout the chain, according to the needs of the plant, raw milk will be for the manufacture of yaourt or other.

The choice of samples is based on the regularity of trafficking: the first half tank, and at the end of milking. The sample is taken by a valve located at the base of the tank thoroughly cleaned and sterilized before each buckling.

Microbiological analyzes were performed after 03 days for three months. The results are obtained by the arithmetic average of three samples.

2.3. Methods of Microbiological Analyzes

2.3.1. Prepare Decimal Dilutions

After homogenization of the sample to be analyzed "milk" is introduced aseptically using a sterile graduated pipette glass, 1 ml of the suspension "SM", in a sterile tube containing the screw 9 prior ml dilution "TSE"; this dilution is then a dilution of 1/10 or 10^{-1}, mix thoroughly.

Then insert aseptically using a sterile graduated pipette glass, 1 ml of the 10^{-1} dilution, in a sterile tube containing the same first dilution 9ml "TSE"; this dilution is then 1/100 or10^{-2}, mix thoroughly, changing the pipette for each dilution.

And so on to the fourth and fifth operation that will be performed in the same way to allow to obtain 10^{-4} dilutions, 10^{-5}.

The choice to seek microbial species in our samples was performed according to Algerian standards [4].

2.3.2. Detection and Enumeration of Total Viable Mesophilic Aerobic Microorganisms or Total

Determination of total mesophilic flora is counting microorganisms in order to assess the microbial population products

2.3.3. Detection and Enumeration of Total and Fecal Coliforms in Solid Medium

From decimal dilutions ranging from 10-3 to 10-1 1 2 wear aseptically 1 ml in two empty Petri dishes prepared for this purpose and numbered.

Then fill each box with about 20 ml deoxycholate agar 1 /or default or VRBG VRBL agar, melted and cooled to 45 ± 1° C.

Then make a circular motion and back and forth and in the form of "8" to allow a homogenisation of the inoculum with the used agar.

2.3.4. Search Staphylococcus Aureus

Depending on the availability of culture media, three different techniques are recommended for research *Staphylococcus aureus* namely:

- Method Baird Parker
- Method enrichment medium Giolitti quartered
- Method enrichment medium Chapman.

2.3.5. Detection and Enumeration of Faecal Streptococci

In milk and milk products, streptococci group (D) and faecal streptococci are sought and counted in a liquid medium by the technique of MPN (Most Probable Number).

Technique in liquid medium involves two consecutive tests, namely:

- The test of presumption: For Research on Streptococci Medium Rothe
- The confirmation test: reserved for the confirmation

itself on middle EVA tubing found at the tested positive presumption.

2.3.6. Detection and Enumeration of Clostridium Perfringens

Depending on the availability of culture media, two techniques are recommended for research Clostridium perfringens namely:

- General method on agar-Liver Meat at 37 ° C,
- Selective Agar Method TSN or TSC at 46 ° C.

3. Results and Discussion

3.1. Microbiological Analyzes

These microorganisms are able to proliferate in the open air and at medium temperatures, specifically those whose optimum temperature is between 25 ° C and 40 ° C on the one hand and on the other hand, those which include micro spoilage organisms.

3.1.1. The Total Mesophilic Aerobic Bacteria (GAMT)

Counting the GAMT is the most common method to determine the level of overall contamination of milk. The results obtained are shown in figure 3.1.

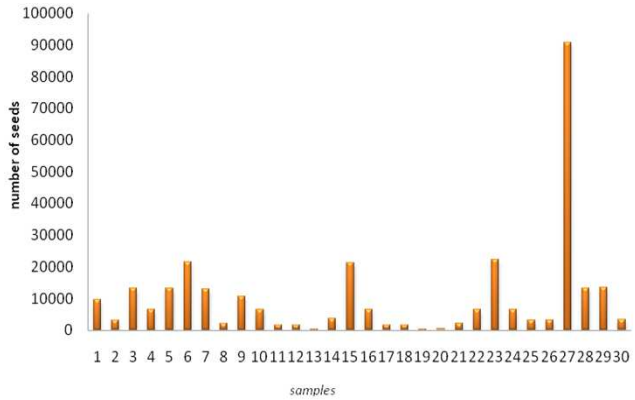

Figure 3.1. *Evaluation of the rate of aerobic bacteria by supplying samples.*

During the evaluation period is observed that 30 samples have a small charge flora [331 CFU / ml -22331UFC/ml] that meet the standards and could be explained by:

- The good health of the barn;
- The purity of drinking water and washing;
- Adequate cleaning of the udder, containers and milking machine before milking;
- Respect delay between trafficking and the time of cooling of milk (which prevents the spread of these germs);
- The presence of sufficient refrigeration;
- Respect for the shelf life of raw milk at room temperature.

It should also be noted that even if the animal is healthy and despite the measures taken (strict asepsis), it is very rare to get a sterile milk, There are almost always within the breast of germs contaminate the milk during milking.

According [5] flora includes pathogenic microorganisms on the one hand, various microorganisms to other alterations; the widespread use of low temperature storage reduces their importance alteration plan for the benefit of the sychrotrophic bacteria. Fortunately pasteurization was effective against pathogens (Staphylococcus, Clostridium sulfite-reductive).

3.1.2. Fecal Coliforms

Their enumeration allows us to appreciate the importance of contamination of milk, the value of the efficiency of pasteurization and the risk of presence of pathogens [5].

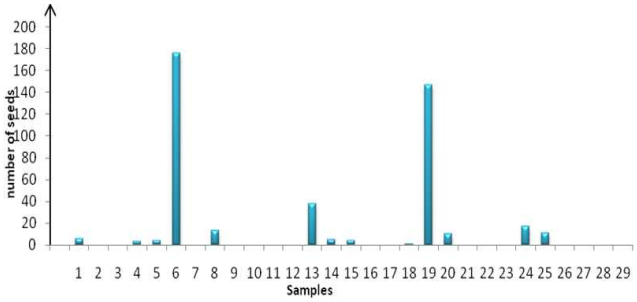

Figure 3.2. *Evaluation of the rate of contribution by coliform samples.*

These results are consistent taken [4], which provides a number of 10-3bact/ml but coliforms usually comes utensils and milking machines, which are the most important source of contamination. This is probably due to contamination of milk utensils not washed walls and poorly dried. Also improper water used for rinsing containers and machines can be the cause of contamination. It should be noted that the non-compliance of conservation of milk at the farm led to increasing numbers of coliforms in milk.

According [6], the presence of coliforms in large quantities is an indication of unsanitary or stabilization because microorganisms part of coliforms can be found in polluted water fecal droppings, manure and decaying matter.

In [7] stipulated that the enumeration of coliforms in milk allows the detection of fecal pollution and therefore the possibility of contamination by pathogenic enterobacteria.

Some species such Escherichia coli strains are some of enteric pathogens may be responsible for severe poisoning [8].

The presence of fecal coliforms may witness fecal contamination that may occur either during milking, transport or storage or lack of personal hygiene and the udder [5].

3.1.3. Result of Search of other Germs

3.1.3.1. For *Staphylococcus Aureus*

In 04 of the 30 samples, the presence of staphylococci in the milk is detected that does not conform to JORA (1998) (0g/ml).

The *S. aureus* frequently contaminate food and can lead

to damage and health problems [7].

Table 3.1. *Results of microbiological analyzes of Staphylococcus aureus*

Samples	Staphylococcus aureus	Samples	Staphylococcus aureus	JORA (1998)
Sample 01	ABS	Sample16	ABS	
Sample 02	ABS	Sample 17	ABS	
Sample 03	+	Sample 18	ABS	
Sample 04	ABS	Sample 19	ABS	
Sample 05	+	Sample 20	ABS	
Sample 06	+	Sample 21	+	
Sample 07	+	Sample 22	ABS	
Sample 08	ABS	Sample 23	+	0 seeds /ml
Sample 09	ABS	Sample 24	ABS	
Sample 10	ABS	Sample 25	ABS	
Sample 11	ABS	Sample 26	ABS	
Sample 12	ABS	Sample 27	+	
Sample 13	ABS	Sample 28	+	
Sample 14	ABS	Sample 29	ABS	
Sample 15	ABS	Sample 30	ABS	

Neighborhoods already infected udder and teat skin may contaminate the milk during milking, due to unsanitary conditions and malfunction of the milking machine.

The teat lesions of any kind are prone staphylococcal infections [3].

3.1.4. For Faecal Streptococci

These germs can come from the environment of the milk ducts of the cow, milking equipment and milk storage [8]. The presence of fecal streptococci is a seat of fecal contamination [7].

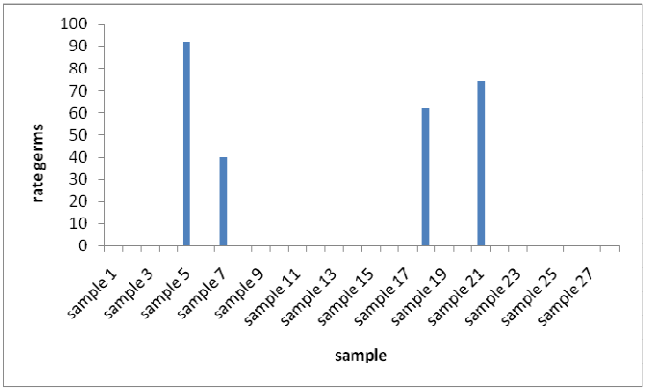

Figure 3.3. *Evaluation of the rate of faecal streptococci by supplying samples.*

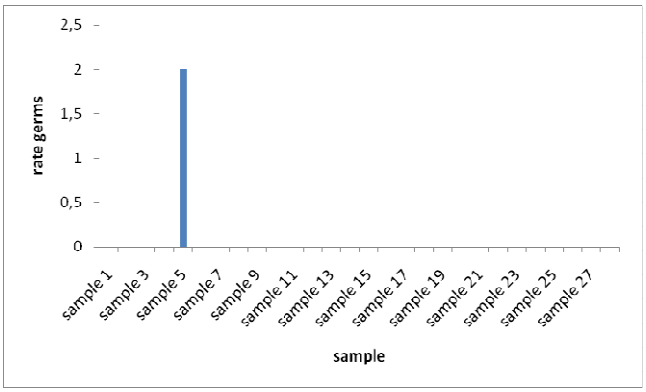

Figure 3.4. *Evaluation of the rate of sulphite-reducing Clostridium*

3.1.5. For Sulfite-Reducers *Clostridia*

Table 3.2. *Results of microbiological analyzes of sulphito-reducing Clostridium*

Samples	Sulfite-Reducers *Clostridia*	Samples	Sulfite-Reducers *Clostridia*	JORA (1998)
Sample 01	ABS	Sample16	ABS	
Sample 02	ABS	Sample 17	ABS	
Sample 03	ABS	Sample 18	ABS	
Sample 04	ABS	Sample 19	ABS	
Sample 05	ABS	Sample 20	ABS	
Sample 06	*02 UFC/ml*	Sample 21	ABS	
Sample 07	ABS	Sample 22	ABS	
Sample 08	ABS	Sample 23	ABS	**50** *UFC/ml*
Sample 09	ABS	Sample 24	ABS	
Sample 10	ABS	Sample 25	ABS	
Sample 11	ABS	Sample 26	ABS	
Sample 12	ABS	Sample 27	ABS	
Sample 13	ABS	Sample 28	ABS	
Sample 14	ABS	Sample 29	ABS	
Sample 15	ABS	Sample 30	ABS	

4. Conclusion

Cow's milk, like other mammals, is a medium composition chemical and physical complex that allows the calf to cover its needs energy and nutrient during the first stage of its existence. This medium is however highly perishable due to its high water content, its pH of acidity and richness that make lactose quickly alterable microbially and enzymatically.

The bacteriological quality of milk requires a methodology and specific techniques: the care, diligence and cleanliness are basic rules of this discipline. Bacteriological examination revealed the presence of:

Total germs, fecal coliforms and Clostridium sulfite-reducers are consistent with standards JORA taken as good hygiene is established to reduce this burden.

Against by the presence of pathogens such as *Staphylococcus aureus* and faecal streptococci in some samples that are of fecal origin from either the breast or equipment of trafficking or non-observance of the hygiene

protocol.

Under our experimental and based on the results of the microbiological analysis requirements. We conclude that the milk is contaminated by pathogens during milking and hygienic quality remains poor. To confirm these observations, it would probably perform analysis on a sufficient number of samples followed by bio chemical study of cow's milk**.**

Recommendations

To improve milk quality and minimize losses, we would like to offer some general recommendations:

The udder is often heavily contaminated with litter or feces; Preclean trafficking is essential; it may be performed dry using a paper towel disposable or using a multi-purpose machine dipped in warm disinfectant solution; udder must then be dried;

- The first streams of milk from each quarter of the udder are always heavily laden with germs; it is necessary to collect them separately and do not mix the milk collected later;
- Microbial contamination can also be caused by the teat when the latter does not have the technical requirements. The following precautions are necessary to obtain a good quality milk:
- Choose a healthy person and having no wounds on the hands;
- Thoroughly wash and dry hands before milking;
- Do not touch equipment (washer milk teat cup liners) with hands soiled;
- Perform cleaning and rigorous disinfection of all materials in contact with the milk;
- Perform trafficking in a clean, clear, free from dust, insects, manure, stagnant water, etc.;
- Ensure rapid milk refrigeration (0-4 °C), if the processing or
- Consumption does not occur within 5-8 hours after collection.

Provide training in the field of milking.

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