WATER HARDNESS AND MICROBIOLOGIC QUALITY, IN DIFFERENT PRODUCTION SYSTEMS

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Abstract

An essential component of managing fams product water resources should be analyse. Without the chemical and microbiological analysis of water samples, it would not be possible the status and safety of drinking milk, which are so essential a requirement for the consumers. The study was carried out in different region of Romania and include three farms, averaging 120 goats per producer with an extensively and semi-intensive production system. This study was made to analyse the water hardness and it's content of bacteria. For this purpose we aimed determination of water hardness using strips with ethylenedinitrilotetra-acetic disodium salt. We measured the chemical hardness of water and the results were depended on the quantity of calcium and magnesium salts present in the water. By the reaction between calcium and magnesium ions the strips had different intensity of colours, so the resultant colour was then used to determine the level of hardness water. Bacteriological tests were made onto Agar medium culture in petri dishes and were incubated at 37°C for 48 and the colour, shape, texture and the presence of haemolysis of the colonies were used to identify the organism. Two of the farmers under semi-intensive production system obtain water from boreholes, chennelled into a tank, while one farmer under extensive production system purchased his from boreholes. Based on the total number of bacteria, the lowest contamination took place in the semi-intensive production system (15 CFU/ml), compared to other system where the bacteriological test indicate 523 bacterial colonies formed units / ml (standard law: 100 CFU / ml). This shows that on this farm, like most small farmers, water used comes from well without being treated before using it. When milk tastes good, many people will accept it as a good quality drinking milk. This may be dangerous because the milk may contain excessive amounts of harmful substances which may have health effects on consumers if the water analysis weren't made.

Key words: Water hardness, microbiologic, quality, milk, production system.

The main objective of agricultural development is to investigate, develop and promote use of goat farms as a source of milk for households and small farmers (Bahcivangi, 1999). This would contribute to providing high quality proteins to the childrens, especially those without direct access to existing products. (Boylan, et all., 1996; Jaubert et all., 1996). It is necessary to ascertain if activity of small centers, represented by small farmers, can compete favorably in the production of goat milk in good hygienic conditions, monitoring and analysing the water samples taken from farmers environment. Without the chemical and microbiological analysis of water, it would not be possible to determine the status and safety of drinking milk, which is so essential to establish the need and adequacy of treatment, and to safeguard human health. (Devendra, 1982; Lowenstein, Speck, 1983) It is hoped that this study will serve as an educational tool to inspire more of our farmers to study the science of measurement and the importance of analysis.

MATERIAL AND METHOD

The study was carried out in different region of Romania and include three farms, averaging 120 goats per producer with an extensively and half-intensive production system. Water may contain dissolved substances or microorganisms which may not necessarily affect the appearance or taste of the water but which may have serious health or other effects, making the milk unfit for domestic use. Water samples were collected in sterile 100 ml recipients, which were labelled with the type of water sources and the farms production system. Preservation, transport and storage of water samples were made as soon as possible to the laboratory for analysis, so the results should be consider conclusive. Water hardness testing. This was carried out using strips with ethylenedinitrilotetra-acetic disodium salt. We measured the chemical hardness of water and the results were depended on the quantity of calcium

and magnesium salts present in the water. The strip was fully wet and after one minute it coloured. By the reaction between calcium and magnesium ions the strips had diffrent intensity of colours, so the resultant colour was then used to determine the level of hardness water. Bacteriological test. An amount of 0,01 ml of water was streaked onto Agar medium culture in petri dishes and were incubated at 37°C for 48 hours in an inverted position to prevent condensing of gases released from bacteria on the inside of the lids. After incubation of the culture we characterized the colony and the colour, shape, texture and the presence of haemolysis of the colonies were used to identify the organism. (Act 54 OF 1972).

RESULTS AND DISCUSSION

Two of the farmers under semi-intensive production system obtain water from boreholes, chennelled into a tank, while one farmer under extensive production system purchased his from boreholes. Based on the total number of bacteria, can be inferred, that the lowest contamination took place in the semi-intensive production system, compared to other system. The organims isolated were recorded and they are presented in the table below.

Table 1

Bodies identified in different production systems (inside the milking ustensils).

PRODUCTION SYSTEM / LOCATION	BODIES IDENTIFIED	SOURCE
Extensive Farm 1	*Enterococcus spp.* *Non-haemolytic* *Staphylococcus spp.*	*Plastic bucket (inner surface)*
Semi-intensive Farm 2	*Aureobacterium spp.* *Staphylococcus epidermidis*	*Hoses with filters*
	Pseudomonas aeroginosa *Aureobacterium* *Staphylococcus spp*	*Water pompe*
	Staphylococcus spp. *Pseudomonas spp*	Water tank
Semi-intensive Farm 3	*Klebsiella oxytoca* *Chryseobacterium meningosepticum*	Metal bucket (inner surface)
	Acinetobacter lwofii *Enterobacter*	Water line (silicone)

The results of clues water hardness and quality microbial tests, under different production systems, are presented in figure 1. This presentation is supported by the bacteriological quality of water used in the extensive production system, which revealed a total of 523 bacterial colonies formed units / ml (standard law: 100 units of colonies formed / ml). This shows that on this farm, like most small farmers, water used comes from the technological process from well without being treated. Although water use in semi-intensive system Farm 3 came from wells and had a total of bacteria from 15 colonies formed units / ml, there was a lower contamination with coliform bacteria.

Based on the number of samples taken, it appears that the highest environmental contamination occurred in the extensive production system in comparison to the other system. This has been tested to determine hardness and microbiological quality. The results are presented in figure 2.

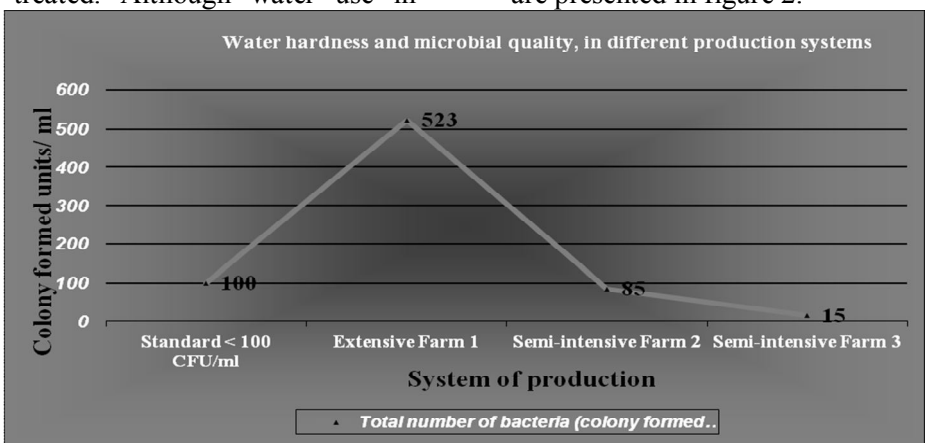

Figure 1 **Water hardness and microbial quality, in different production systems**

Most coliform bacteria are produced from water, something previously supported by other authors, explaining that this variation could be attributed to water quality from wells, in the extensive system (Gilmour et al, 1981). Also, we can say that, water contamination with saprophytic organisms derived from different sources, but, especially, from soil or vegetation. Also, the presence of these organisms in water serves as an indication of pollution of the water by human wastes. The same quality water was used for washing and rinsing equipment without containing a disinfectant. This demonstrates that bacteria present in water is a source of contamination of the milk. These results reveal the importance of water to produce safe milk.

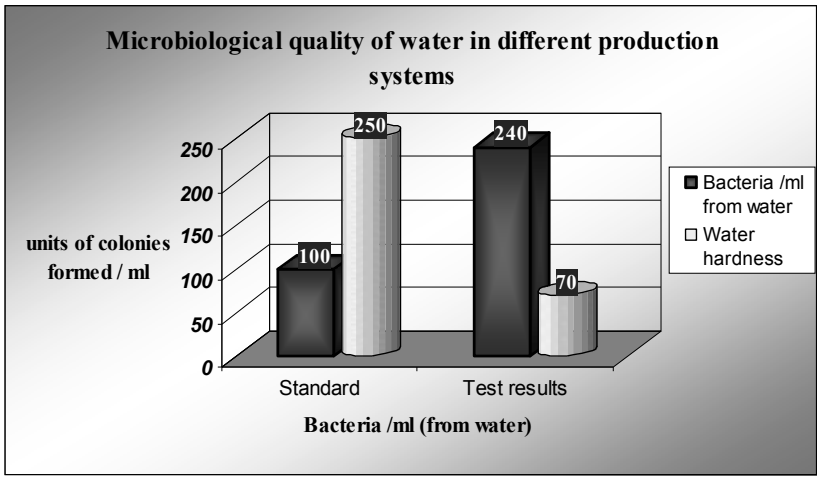

Figure **2 Microbiological quality of water in different production systems**

A possible source of contamination can be the farmer hands and thus emphasize the importance of personal hygiene during water transport. When milk tastes good many people will accept it as a good quality drinking milk. This may be dangerous because the milk may contain excessive amounts of harmful substances which may have health effects on consumers if the water analysis weren't made.

CONCLUSIONS

The quality of water in our dairy farm is very important and is necessary that the analytical results be reported as a specific value together with milk analysis. An analysis report is a contract document which provides request information on the quality of the product to a client, that is why training our farmers on hygiene principles and practices could overcome these obstacles, ensuring a good quality milk.

To illustrate all this, and because the majority of small farms could not afford to use disinfectants, it should be promoted certain methods of submission of milk at high temperature or acidifying it, like pasteurization. Encourage development circle to increase small farmers goats can be increased especially if processing systems are easily adaptable.

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