

## **RESEARCH ON IDENTIFICATION AND RISK ASSESSMENT IN UNITS OF OBTAINING AND PROCESSING OF MILK AND MILK PRODUCTS**

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### **Abstract**

*The products in agriculture and animal husbandry are the raw materials for agro-industrial sector provides not only food company. Strategic importance in terms of milk food has made the world to take shape so to develop as a branch basis of agriculture, milk production, both qualitatively and quantitatively in terms.*

*For milk production to include within the parameters set by international law and substantial investments are required. Perform microbiological tests to achieve a wholesome product, is a mandatory activity in all units of obtaining (farm) and milk processing and products Dairy (units). Result of analysis should reflect the existing hygienic conditions when harvesting and obtaining industrially.*

*Throughout the process of obtaining milk and milk products, since dairy farm and then continue processing plants, milk can be contaminated with various microorganisms decreasing nutritional value, causing the appearance of defects and milk products, reaching its final cause disease in consumers. The danger of contamination is not observed if certain regulatory, regulations, requirements and measures of hygiene.*

**Key words:** parameters, standard conditions, risks, mastitis, milk quality

### **INTRODUCTION**

Following research in the industry for obtaining and processing of milk and milk products, has demonstrated that food safety begins at the farm. This achievement is possible if the farm are not respected rules and measures both the correct and healthy animal feeding, and rules and hygiene measures. In order to obtain a quality product, the International Organization for Standardization has issued standards that include requirements, standards, specifications and necessary measures. In application and compliance products will get healthy, consistent and quality. Quality is a desirable social objective and act as the main factor for obtaining success in a competition.

This paper aims to identify and highlight the microbiological hazards that may occur in milk processing units, when not strictly followed the rules and

procedures imposed by international and European law. In this paper we particularly insisted on mastitis and the cows due to high impact that this disease has on quality and quantity of milk. Throughout the process of obtaining milk and milk products, since dairy farm and then continue processing plants, milk can be contaminated with various microorganisms decreasing nutritional value, causing the appearance of defects and milk products, reaching the final to cause disease in consumers. The danger of contamination is not observed if certain regulatory, regulations, requirements and measures of hygiene. Sources and levels of contamination are highly variable. Knowledge of these sources is very important to prevent and reduce contamination to levels that do not affect consumer health.

## **MATERIAL AND METHODS**

Perform microbiological tests to achieve a wholesome product, is a mandatory activity in all units of obtaining (farm) and processing of milk and milk products (units). Result of analysis should reflect the existing hygienic conditions when harvesting and obtaining industrially. Sampling was done in aseptic conditions using sterile utensils and containers, avoiding external contamination. Harvesting technique was different depending on where, containers and surfaces investigated.

The species of bacteria on which we insisted and we conducted tests are those stipulated by legislation. Taking into account all these aspects.

I proposed to do research watching two major steps, namely:

I) identification and assessment of microbiological hazards in dairy farms;

II) identification and assessment of microbiological hazards in milk processing units and dairy products.

I. To analyze the research we considered two dairy farms, called F1 and F2 in ministry, and two units of milk processing and dairy products, called U1 and U2 in the paper.

For F1, F2, we have identified these risks possible:

1. Identify risks of contamination from getting milk from the mammary gland, in case of illness with mastitis.

2. Identify risks of contamination with NTG - mammary gland - the first jets of milk - fresh milk milking;

3. Identify risks of contamination of milk by microbiological analysis of mechanical milking devices;

4. Identify risks of contamination for breaches of the hygiene conditions of the hands working in F1si F2;

5. Identify risks of contamination of containers - tanks for storage and transportation of milk, storing milk before;

6. Identify risks of contamination for breaches of the hygiene conditions in shelters aeromicroflora premises (farms).

II. For U1, U2, we have identified these possible risks:

1. Identify risks of contamination in milk reception of tanks;
2. Identify risks of contamination from the surface of tank;
3. Identify risks of contamination from the surface of hoses headrace, before work starts;
4. Identify risks of contamination from the surface of storage tanks, before work starts;
5. Identify risks of contamination of the surface spin;
6. Identify risks of contamination from the packaging area;
7. Identify risks of contamination of the hands of employees;
8. Identify risks of contamination for breaches of the hygiene conditions of aeromicroflora rooms, warehouses and manufacturing facilities.

I.1. Milk quality can be achieved only if in healthy condition, the conditions under which the obligation of the manufacturer to be hygiene in all its aspects. This product is an excellent culture medium and protection for more microorganisms.

The rules and procedures that form the basis for obtaining a wholesome product are: space and existing conditions in dairy farms, cleaning, disinfecting or deleting all those with mammary gland a direct action on the quality of milk and milk products implicitly.

Space and Circumstances dairy farms are an average of direct contamination of milk if hygiene rules are respected.

Cleaning and disinfection before milking mammary gland leads significantly to a milk with a low microbial load. Delete mammary gland after washing and disinfecting it, is also on a special importance, preventing penetration of microorganisms in milk so that remain in the water washing and in substances and products used decontaminated.

When bacteria come in bag leading to mastitis occurrence, white blood cells (called somatic cells) will penetrate blood vessels arriving in the bag and trying to fight infection. A minimum number of somatic cells is always present in milk, but in case of infection / mastitis Somatic cell counts increased.

Thus the number of somatic cells is an excellent marker for identifying mastitis. Mastitis reduces milk production up to 15% as seen from *Figure. 1*. Mastitis change milk composition, less casein - the main protein in milk - and less fat.

Mastitis in cows milk are the most important diseases of the mammary gland, with implications zoeconomics due to losses in milk production, early reform of sick animals and the risk that infected milk is the public health. Although there has been significant progress in monitoring and therapy of these conditions, however, found that these conditions are sub-optimal results, the frequency of these masks are effective in some animals at higher levels, which has a negative influence on production parameters and default on economic indicators in dairy farming. In this context, addressing issues regarding mastitis in cows milk is appropriate, as further studies are needed to cover all aspects of etio-patogenie, diagnosis and treatment of complex phenomena involved in the optimization of control programs and therapy of these disorders.

Following research by specialists in the field it was found that cows with mastitis that are down different milk production, which leads, in most cases an abnormal lactation curve, with negative effects on total milk production as follows:

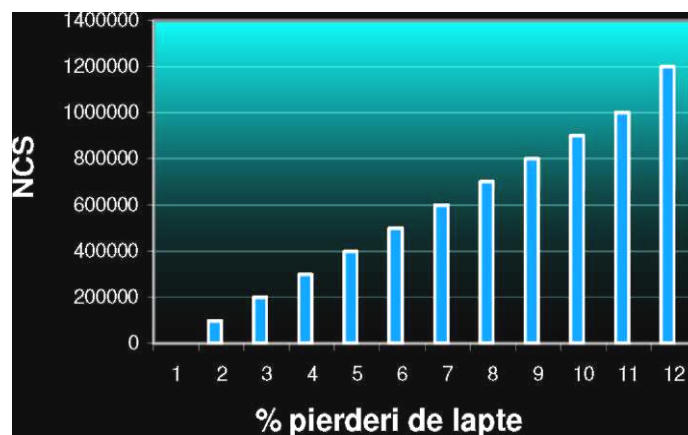
- for mastitis HIV Milk production falls by 85.2 liters per total premium;
- If bluetongue mastitis milk production decreases with 106.5 liters per total premium;
- The cow with purulent mastitis losses in milk production range from 500 liters per lactation ( if damage to one quarter of breast, which partially recover from illness) and 1500 liters per lactation (fibrozary compartment where experienced breast disease);
- if followed by fibrozarea mammary gland damage in a proportion of 3 / 4 or 4 / 4 of districts, the total loss is through compromise and reform lactation female.

Research conducted by us consists in taking and analyzing samples of milk with a special device that automatically detects this mastitis.

The advantages of using this product milk collection, and analysis of mastitis are:

- The sample of milk in hygienic conditions of a high quality;

NCS and loss of milk



- The single console mount allows attachment device for taking samples of milk per milking room channel wall;
  - made of quality materials resistant to chemical cleaning agents;
  - The device is operated simply with one hand, the user can remove the glass cabinet with a simple twist. Shell can be laundered in location location.

Following our research sampling device milk autonomous Vision 200 ml mark, luckily the F1 and F2 have not found this to any cow mastitis of livestock taken from two farms in our analysis.

Worth mentioning is that repeated tests of new weekly, during July-September 2008, were made to the device mark Vision, which is in inventory Sanitary Veterinary Directorate, Oradea - Bihor.

I.2. Compliance with hygiene conditions during milking is a prerequisite for obtaining a product of wholesome. Rules on animal health concerns primarily as dairy animals are in good health, state maintained through a strategic program to prevent and combat various diseases affecting milk production. An important factor to meet hygiene standards is the existence of the source of cold water and hot water for proper sanitation of milking equipment and vessels for collection and transport. Cleaning and disinfection before milking mammary gland produces a product with low microbial load. This measurement is known to all farm animals and two farms which our attention is respected this condition. Deleting the mammary gland after washing and decontamination is very important, preventing penetration of microorganisms in milk so that remain in water for washing, and in products used for decontamination. In the two farms delete mammary gland after washing practice using cloth towels or gauze. Cleaning and disinfection of cloth towels or gauze used to delete the mammary gland is required.

In the udder, milk can not say it is sterile, because the nipple channel in many germs that enter the udder for their development through several phases: - Phase bactericidal in fresh milk milking, number of microorganisms do not grow a certain period of time ( 3-6ore) even decreases. So milk prevents the development of microorganisms and some even die. Therefore we can say that milk has bacteriostatic and bactericidal properties. Bactericidal action is due to specific substances in milk-antibodies bind to lactoglobulina, lizocina, lactenina I (active in colostrums), lactenina II (active in normal milk), and lactenina III (active in milk obtained in the last days of lactation.) - Acidification phase is the phase in which bacilli grow milk cause acidification of milk stored in a convenient temperature on lactose fermentation and casein coagulates. Acidity increased at a time inhibit the growth of yeasts. - Phase neutralization yeasts development is based on consumption of lactic acid neutralizing or

alkalinized environment. - Decay phase is the phase in which bacteria develop decay that found neutral or alkaline environment prepared by yeasts friendly bacteria multiply their. These decay were especially brutal action on casein milk taste and smell repulsive printing excluding consumer milk (sap Cornelia (Cociuba), Camelia Bara, Carmen Ionescu - 2001, Microbiology and quality control of milk and milk products, University of Oradea ISBN 973-8219-46-9).

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For all these categories possible risks that may occur when getting milk, I sampled in order to determine the following examinations namely:

- a) Determination NTG
- b) Determine the total number of yeasts and molds,
- c) The determination and isolation of coli forms and the species *Escherichia coli*,
- d) Determining most probable number of coagulase-positive staphylococci; All samples for all tests we have taken with a sterile, so the surface samples of mammary glands and milk. Milk samples we have obtained in sterile devices, which sealed after were obtained and samples were taken for laboratory analysis. Other samples besides those mentioned were of: milking device and inside containers and devices to be stored in the milk after obtaining,

a) To determine the total number of germs on contact surfaces namely surface mammary gland and milk but I have done according to standard procedure.

Collection and sampling to determine if the surface NTG mammary gland, we have only been after the process of washing, disinfecting or deleting mammary gland using a device that removed virtually sterile surface of the gland, after which I brought the device with the sample in a sterile saline solution. Samples of milk we have taken some of the first jets, and some after it, then we went to the laboratory to realize the tests (all tests of milk we have done the same).

To determine the laboratory's NTG I done by serial dilutions method, method and feature of this type of analysis we used the nutrient agar culture medium. After conducting operations analysis, we introduced in both culture media incubated with samples from the surface of the mammary gland and milk samples, after which I interpret the results (Table 1). For all possible risks, determining realized NTG a mention in the same way as I did research on a sample of 60 samples.

Table 1

Interpretation of results for NTG

Origin of samples	Nr. samples examined (cow)	Date	Registered parameters	Comments
Mammary gland area (F1 and F2)	8	21.07.2008	80.000/cm <sup>2</sup>	Are registered in the normal parameters
	5	04.08.2008	50.000/cm <sup>2</sup>	-
	7	19.08.2008	30.000/cm <sup>2</sup>	-
	10	02.09.2008	30.000/cm <sup>2</sup>	-
Milk - the first jets (F1 and F2)	5	21.07.2008	40.000/ml	-
	3	04.08.2008	30.000/ml	-
	2	19.08.2008	40.000/ml	-
	5	02.09.2008	40.000/ml	-
Milk (F1 and F2)	5	21.07.2008	30.000/ml	-
	2	04.08.2008	30.000/ml	-
	3	19.08.2008	40.000/ml	-
	5	02.09.2008	30.000/ml	-

b) To determine microbial flora in the air and total number of yeasts and molds in the room (m<sup>3</sup> air), we proceeded according to standard procedure. To determine NTG in room air, these farms, we used the agar culture medium, distributed in Petri plates on we sat at different distances and heights. To determine the total number of yeasts and molds, we used the agar culture medium with malt and yeast extract, for all risk categories, namely both the possible risks of the surfaces contact, samples of milk. After we have taken samples, they were taken to the laboratory after having been processed as follows: Petri dish with agar for NTG, we incubated at 37°C for 24 hours and NTG Petri dish for yeast and mold I incubated at room temperature, respectively (18 to 25 °C) for 5 days, in places protected from light and air currents, and interpretation of results we developed a separated molds and yeasts.

c) We know the group of coli forms is an indicator of microbiological health with great significance, which reveal the terms of achievement and product handling, but also efficient thermal treatments applied to them. highlighting them is based on the property to ferment lactose with

production of gas. For this purpose we used culture medium containing sugar, namely: BBLV - liquid medium, agar Levine Tipton water and nutrient agar inclined. In the first part of the determinations we have made determination of coli forms using Mc table, Crady, reporting the largest probably coli form. I proceeded to confirm the seeding on average Levine.

d) Detection of staphylococci is based on the property to develop in the presence of high concentrations of sodium chloride 7,5-15%, and to form characteristic colonies on selective culture media. Media culture that I used were: hipersalin broth Chapman, Chapman and plasma citrate agar hipersalin. I used the table for identifying staphylococci Mc. Compared with the number of dilutions Crady confirmed.

## RESULTS AND DISCUSSION

Making milk microbiological examination is mandatory in all units of obtaining (farm) and processing of milk and milk products because they are the primary critical points in the risk of contamination may occur in obtaining milk.

Mastitis is the condition which leads to the higher expected costs for a farmer. The negative effects that may arise from contamination with mastitis may include:

- Loss of milk production;
- reduced amount of milk on milk quality payment schemes;
- costs of treatment and veterinary care;
- Cost of contaminated milk;
- animal Separation sick.

Following our research sampling device milk autonomous Vision 200 ml mark, luckily the F1 and F2 have not found this to any cow mastitis of livestock taken from two farms in our analysis . Worth mentioning is that repeated tests of new weekly, during July-September 2008, were made to the device mark Vision, which is in inventory Sanitary Veterinary Directorate, Oradea - Bihor.

a) To determine NTG, After conducting operations analysis of inquiries made that neither milk nor mammary gland and not in this case a critical risk, all samples taken in the analysis fits in the normal parameters (*Table 1*).

b) Also in the analysis for determining the number of yeasts and molds, we found results that go beyond and veterinary requirements, or national and international legislation on quality.

c) In the analysis to determine the most probable number of coli form bacteria and *Escherichia coli* species, we recorded the following analysis, presented in *Table 2*.



Table 2

## Interpretation of results for coli form bacteria and Escherichia coli

Origin of samples	Nr. samples examined (cow)	Date	Formula registered	Nr. coliforme B.	Confirm. for. E. coli
Dairy farms – F1	1	05.08.2008	310	45	-
	2		311	75	-
	1	12.08.2008	000	-	-
	2		000	-	-
	1	18.08.2008	000	-	-
	2		011	6	-
Dairy farms – F2	1	05.08.2008	121	15	-
	2		120	11	-
	1	12.08.2008	000	-	-
	2		000	-	-
	1	18.08.2008	222	35	-
	2		220	20	-

Following research conducted found that in this case not exceed the parameters and legal requirements.

d) Following laboratory tests were recorded in some samples, the average selective isolation Chapman, specific cultures staphylococci but coagula test proved that no part of the group of coagulase-positive. So therefore are non-pathogenic, which is why I have not mentioned the origin of the samples, but mention that I paid a research firm both on a sample of 40 samples during research for this purpose.

## CONCLUSIONS

Complexity of the subject, that got milk hygiene and farm production and processing units refer and treat most other forms of pollution and contamination of existing microorganisms, you have to recognize is a subject not easy.

Milk is a product of the mammary secretion and is from all points of view, a heterogeneous disperse system in which all parts form true solutions. It is the ideal food for all consumers because it contains almost all necessary body substances.

Milk for human consumption, regardless of what the sector comes to be fulfill the following requirements:

- come from healthy animals, subject to regular clinical examination, including tests revealing some human diseases;
- to be obtained, kept, transported and processed under conditions that do not influence its quality;

- to present organoleptic, physico-chemical and bacteriological standards as all official domestic and international;
- to not be distorted by the addition of water or other substances added to fraudulently etc.

The main problem and required to obtain a healthy milk, hygienic and quality, consists in taking all steps to prevent any microbial contamination from the site to obtain its final destination, namely consumption. Therefore it is necessary to implement and to comply with management responsibility in this regard and to meet all requirements of it.

HACCP compliance but also present in the ISO 9001:2008 standards for products and services quality and ISO 22000 on food safety can be a basis for the production line, that does not affect consumers' health.

Quality Management Systems (CMS) aimed at all stakeholders in the results and performance of an organization, currently has a meaning and importance of an increasingly high.

Sources and levels of contamination are extremely varied. Knowledge of these sources is very important to prevent and reduce contamination to levels that do not affect consumer health.

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