

## QUALITY OF MILK FROM COWS OF THE MOLDAVIAN TYPE OF BLACK & WHITE AND RED ESTONIAN BREEDS

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### Abstract

*The study's objectives consists of appreciating the influence of Black & White and Red Estonian breeds on the quality of cows' milk. Researches had been held at the cattle farm from the Technological Experimental Station „Maximovca”, at the Scientific Practical Institute of Biotechnology in Zootechny and Veterinary Medicine. Milk samples had been collected in the day of milking control. The milk analysis had been made in the laboratory quality of animal products evaluation at the Department of Animal Husbandry of the State Agrarian University of Moldova, by using the ultrasonic analyzer “Lactoscan”. There had been appreciated the content's parameters of fat, protein, non-fat solids, lactose, density, freezing point, amount of added water, pH, temperature and the conductivity in the fresh milk. In breed Black & White it had been got the milk content 4.1% of fat, 8.9% of non-fat solids, 4.7% of lactose, but in Red Estonian breed the collected milk had correspondingly the following indices: 4.8%, 9.2%, 4.9%. It had been proved the possibility of obtaining milk with a superior quality yin both breeds, but in Red Estonian breed the milk the content of fat was higher, as well non-fat solids and lactose. It is recommended to use the analyzer «Lactoscan» for the acquisition of milk as a raw material.*

**Key words:** Cattle, milk, analysis, quality, cows, breeds

### INTRODUCTION

Milk production is a strategic sector of the agriculture, since milk and dairy products are major importance in food rations of the population, including children and the elderly and vulnerably situation people. Milk quality depends on many factors including the importance of breed is coming and feature of their productive cows. Up the present time milk quality obtained from approved breeds in Republic of Moldova has been studied only in terms of fat content and the protein content was studied using formulas and conducting of the fat content. In view of the situation and the possibility of using modern equipment for measuring the quality of milk there was conducted research on studying the quality of milk raw material obtained from cows of Moldavian type of Black & White and Red Estonian breeds.

The study's objectives consist of appreciating the influence of the breeds on the quality of the milk raw material.

### MATERIAL AND METHODS

Research has been carried out at the cows farm in the Technologic Experimental Station «Maximovca» of the Scientific Practical Institute of Biotechnology in Animal Husbandry and Veterinary Medicine. Milk samples had been collected in the day of milking control. The milk analysis, had been made in the laboratory quality of animal products evaluation at the Department of Animal Husbandry of the State Agrarian University of Moldova by using the ultrasonic analyzer “Lactoscan”. For the analysis of milk there was used ultrasonic milk analyzer MCC (Milcotronic Company).

Milkotronic offers series of user-friendly, rapid analysers which can be applied for measurement of fat (FAT), solids non-fat (SNF), density, proteins, lactose, salts, water content percentages, temperature (°C), freezing point, pH, conductivity, as well as

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total solids of one and the same sample directly after milking, at collecting and during processing. The new generation ultrasonic milk analyzers Lactoscan make revolution in the milk collection – the milk analyses pass from milk laboratories towards milk collecting centers, farms, and small dairy farms. With 12 V adapters, milk analysis can be moved on the milk collection trucks. Possessing high accuracy and speed – portable ultrasonic milk analyzers Lactoscan are competitive with the milk analyzers of Foss Electric, Delta Instruments and Bentley but on much better price. Their minimal

power consumption and lack of consumables make milk analyzers Lactoscan attractive for the dairy industry. Easy to work with, low cost maintenance and low price make milk analyzer Lactoscan suitable for dairy farms, dairy enterprises, milk selection centers and laboratories. The milk analyzer is to make quick analyses of milk on fat (FAT), non-fat solids (SNF), proteins, lactose and water content percentages, temperature (°C), freezing point, salts, as well as density of one and the same sample directly after milking, at collecting and during processing.

Table 1 Measurement of the quality of milk and precision

Indicators	Measuring range:	Maximum permissible absolute error
Fat	from 0,01 to 25%	± 0.10%
Non – fat solid	from 3% to 15%	±0.15%
Proteins	from 2% to 7%	±0.15%
Lactose	from 0.01 % to 6 %	±0,20%
Density	from 1015 to 10 40 kg/m <sup>3</sup>	±0.3 kg/m <sup>3</sup>
Water content	from 0 % to 70 %	±3.0%
Temperature of milk	from 1°C to 40°C	±1.0°C
Freezing point	from – 0,400 to – 0,700°C	±0.001°C
Salts	from 0,4 to 1,5%	±0.05%

The difference between two consequent measurements of one and the same milk could not exceed the maximum permissible absolute error.

## RESULTS AND DISCUSSIONS

Herd of cattle and dairy production in the Republic of Moldova are presented in table 2.

Table 2 Milk production in the Republic of Moldova

Indices	Year						
	1990	1995	2000	2005	2008	2009	2010
The stoks of cattle at the beginning of the year, thousand heads	1112	751	423	331	232	218	216
Including cows, thousand heads	402	367	275	231	169	160	154
Average milk production per cow per year, kg	3735	2043	2039	2800	3011	3316	2435
Annual production of milk, 1 000 tonnes	1511	762	574	659	510	539	554

A board analysis of the sector for the production of milk in the Republic of Moldova reveals the following:

- herds of cows are in permanent decline;

- 97% of the herds of cows are grown in rural households, population in a household;

- the sanitary-ecological situation was worsened in the rural area

- milk produced in the private households is a seasonal production and lower quality;
- it is difficult to ensure the milk processing establishments processing capabilities with the raw material during autumn and winter time;
- capacities of processing of milk are used on average at 22,6%.
- At the beginning of 2010 in all categories of population was 216 thousand cattle heads and only 51.1% compared to the year 2000 and 19.4% compared to the year 1990. Was reduced and the herd of dairy cows, at 56.0 and 38.3%. The total number of cattle decreased by 5.2 time, including cows – by 2,6 time. Annual production of milk decreased in the same period by 2.7 time.
- The situation can be improved by:
  - good knowledge of productive index and growth characters of the best breeds of cattle;
  - the gradual passage of stoks of cattle from the rural households in extravilan;
  - modernisation of existents cattle farms and the implementation of the modern technologies.

- Zootechnical farms require to be equipped with modern equipment and machinery that will allow obtaining production of milk quality. It is necessary to improve the conditions of maintenance, nutrition and exploitation of animals. Genetic improvement and the creation of the sufficient fodder will create conditions for an increase in productivity of cattle, global quantity of milk production and ensuring maximum capacity of qualitative raw material processing.

In the Republic of Moldova there was created the new Moldavian type of Black and White breed with the genetic potential at the level of 4,5-6,0 kg of milk with fat content of 3.6%. The new type is obtained on the basis of an improvement in the local populations of the Simmental and Red Estonian breeds with the use of imported bulls of the Black and White and Holstein breeds. New type of animals have well developed milk udder, are suitable for the machine milking and the breeding both at the small dairy farms and on industrial type complexes (S. Chilimar, 2011).

Table 3 Milk production

Indices	Unit	Breed	
		Moldavian type of Black and White	Red Estonian
First lactation			
Stock		11	28
Milk production	$\bar{X} \pm S_x$ , kg	3795,5±155,4	3091,8±142,8
Fat content	$\bar{X} \pm S_x$ , %	3,98±0,04	4,039±0,03
Second lactation			
Stock		8	20
Milk production	$\bar{X} \pm S_x$ , kg	3704,7±250,6	3374,1±251,7
Fat content	$\bar{X} \pm S_x$ , %	4,00±0,06	3,9±0,04

The data presented in Table 3 shows that the largest quantity of milk in Moldavian type of black and white breed is obtained from cows at first lactation and consists 3795 liters by 545 liters higher than the nonstandard breed, when the animals physiologically produce greater quantity of milk from two lactating cows at second lactation production is 3704 liters, so by 104 liters more than the nonstandard breed. The

milk production in Estonian Red breed of cows at first lactation was 3091 liters, so by 191 liters more than the nonstandard breed for cows at second lactation production was 3374 liters, again is higher by 74 liters to nonstandard breed. From table nr. 3 is also observed an increase in fat content from 3.985 to 4.005 in Moldavian type of Black and white breed and in Estonian Red breed this index increased from 4.035 to 3.9%.

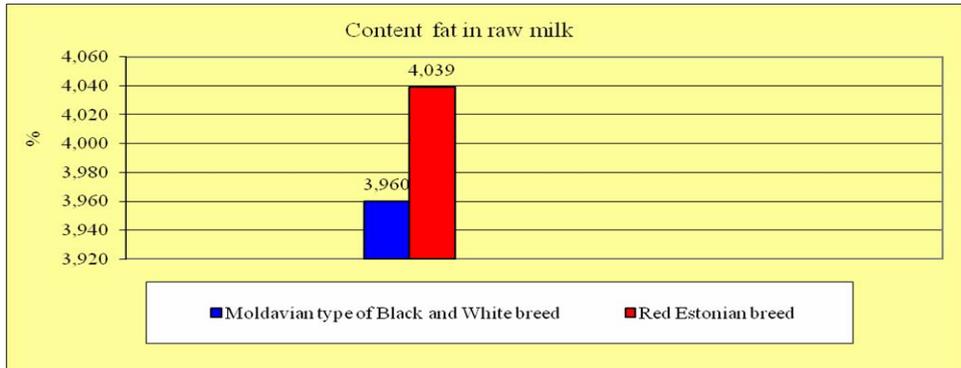


Fig. 2 Content fat in raw milk

Figure 2 Shows a difference in fat content from nonstandard breed, at Moldavian type of black and white this index was by 0.38% higher and at Red Estonian higher by 0.33%, at Estonian Red breed fat content is higher by

0.05% than at cows of Moldavian type of black and white breed.

Figure 3 shows that non-fat substance content is higher in Estonian Red breed cows by 0.3% to Moldavian type of black and white breed.

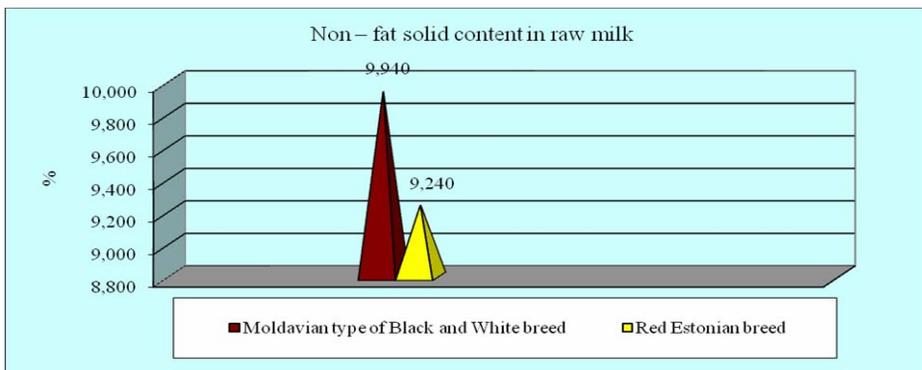


Fig. 3 Non-fat solid content in raw milk

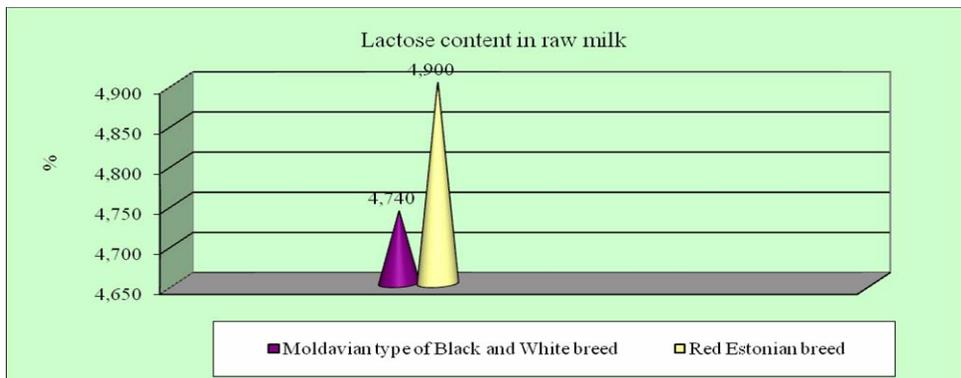


Fig. 4 Lactose content in raw milk

Figure 4 shows that the lactose content is higher in the Estonian Red breed of cows by 0.16% than in Moldavian type of black and white breed.

Trom figure 5 is observed that the mineral content is higher in the Estonian Red breed of cows 0.03% than in Moldavian type of black and white breed.

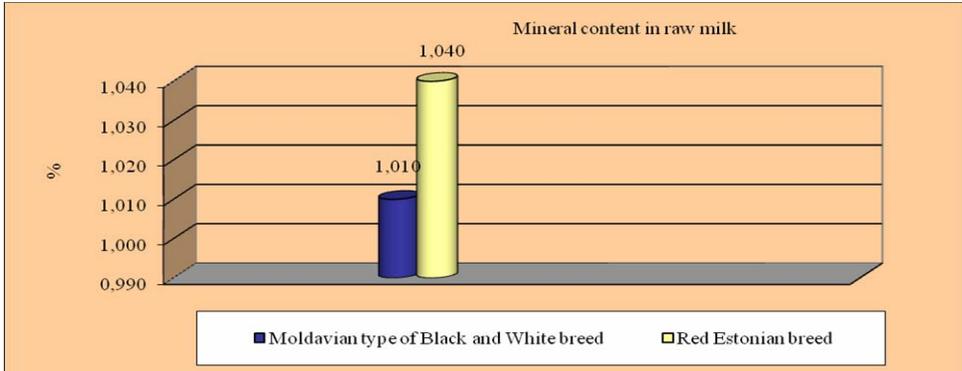


Fig. 5 Mineral in content milk

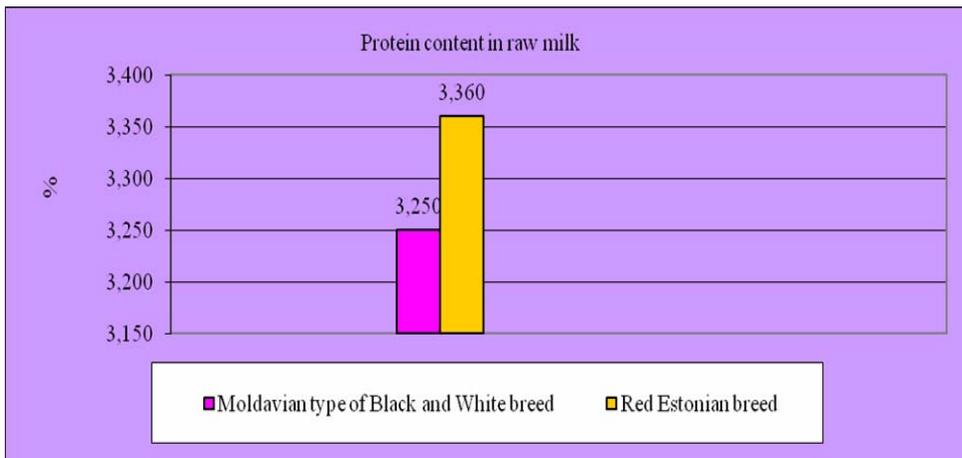


Fig. 6 Protein content in raw milk

Figure 6 shows that protein content is higher in the Estonian Red breed of cows by 0.11% to Moldavian type of black and white breed.

Table 4 Medium values of chemical composition and physical properties of milk normally obtained from the cow to Moldavian type of black and white breed and Estonian Red

Breed	Fat	Non - fat solid	Density	Lactose	Mineral	Protein	Freezing point	pH	Electrical conductivity
Moldavian type of black and white	3,98	8,94	31,94	4,74	1,01	3,25	-0,587	6,52	3,67
Estonian Red	4,039	9,24	31,98	4,90	1,04	3,36	-0,613	6,36	3,26
The difference	0,05	0,3	0,04	0,16	0,03	0,11	0,26	0,16	0,41

According to our data in Table 4 show that the difference between these two breeds in for the composition and physical properties are, namely in which also the fat content, non – fat solid, lactose, minerals and protein are superior to the Estonian Red breed .Also the fat content in both cases is higher to nonstandard race, so if Moldavian type of black and white with is higher and by 0.38 for the Estonian Red breed 0.33. After the percentage of protein for Moldavian type of black and white is lower by 0.11 to the Estonian Red breed.

## CONCLUSIONS

The resultants showed that milk production and quality of its indices are different, both between races as well as to animal breed standard, so they are depending on the breed of animal. In fact concerning milk production is lower at Estonian Red breed of cattle than at Moldavian type of black and white during two lactations also the both lactations for milk productivity and fat content are higher from standarts breed. For cows apartanied Modavian type of Black and White breed also the milk production, fat content, are above standard, but for the content of mineral substances and non – fat solid, lactose, protein milk quality from every race is inferior of milk obtained from the Estonian Red breed. Figure 1 Shows a difference in fat content from nonstandard breed, at Moldavian type of black and white this index was by 0.38% higher and at Red Estonian higher by 0.33%, at Estonian Red breed fat content is higher by 0.05% than at cows of Moldavian type of black and white breed, figure 2 shows that fat-substance content is higher in Estonian Red breed cows by 0.3% to Moldavian type of black and white breed, figure 3 shows that the lactose

content is higher in the Estonian Red breed of cows by 0.16% than in Moldavian type of black and white breed, from figure 4 is observed that the mineral content is higher in the Estonian Red breed of cows 0.03% than in Moldavian type of black and white breed, figure 5 shows that protein content is higher in the Estonian Red breed of cows by 0.11% to Moldavian type of black and white breed.

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