

CORRELATIONS BETWEEN THE ADAPTIVE CAPACITY IN BUCOVINA OF LIMOUSINE COWS AND THE NUTRITIONAL QUALITY OF THE MILK

Carmen CREȚU¹, Raluca Oana RUSU¹, Irina Oana TĂNASE¹, Cristina HORHOGEA¹,
Florentina DARABAN¹, Anca DASCĂLU¹, Mihaela SPĂTARU¹

e-mail: cretucarmen@uaiasi.ro

Abstract

The Limousine breed is spread on all continents in 64 countries, and Romania will be the 65th country in which it is trying to adapt this breed of cattle. Limousine is currently ranked No. 1 in England and is highly regarded in other countries, including France, No. 2, Canada, No. 2, Italy, and the United States. 3rd place. The main objective of this project is to observe the adaptability of the Limousine breed to the geo-meteorological conditions recorded in northern Romania, the Bukovina region. The aim of the paper is to evaluate from a nutritional qualitative point of view the raw milk obtained from this breed. The investigations were carried out to establish the degree of freshness, integrity and we monitored some physical-chemical and hygienic parameters of the raw material milk. Sampling was done directly from the collection vessels after milking and filtration mainly in the hot season, and their processing was done in the Food Control Laboratory of the Faculty of Veterinary Medicine Iasi, where a number of 38 milk samples were processed. Following the analysis of the samples, a number of 8 samples were inadequate in terms of organoleptic examination and integrity. Deviations from the organoleptic characteristics of the parameters of appearance, color, smell, and taste represented a percentage of 21.05%. The determinations of the Physico-chemical parameters were classified as inappropriate a number of 10 samples which represents a percentage of 26.31% of the total samples collected.

Keywords: cow's milk, Limousine cattle breed, physicochemical parameters, hygienic quality

Cattle breeding is a special production department of animal husbandry, which, both now and in the future, is and will be in the attention of specialists, due to the importance of this sector for the national economy. Through the biological capacity to capitalize on nutrients from feed into very valuable products for human food, cattle contribute to raising their standard of living.

The current world situation shows that as the standard of living of mankind increases, the share of consumption of plant-based foods in favor of those of animal origin decreases. Cattle are of particular economic, social, and ecological importance, as they provide a large and diverse volume of animal production and products of prime importance for human consumption as a raw material for the processing industry.

Lately, the European consumer is asking for cheap, fat-free, good quality, and healthy products. This demand has recently been associated, but insistently, with the demand for products obtained on farms with traditional farming systems (organic products), and with ensuring maximum comfort for animals.

The specialized Limousine breed for meat production, originating in France, comes from the

old cattle populations, the first dating of the breed register was around 1886 (Grandcoing Philippe *et al*, 2004) forming during May for centuries in the central and central-western part of Limoges in the Limousin region of France (Dervillé Marie *et al*, 2009).

The limousine breed is a rustic breed, females have very good fecundity and fertility, it is easy to maintain and care for (Choroszy Z., *et al*, 2011). It survives even in the most rudimentary conditions, in less performing stables, and makes very good use of any type of pasture at any altitude in summer, consuming fibrous and coarse fodder in winter.

The breed is large in size with a rump height of 1.35-1.5 m, short head, deep chest, fine skeleton, the weight of cows between 650-950 kg and bulls 1,100-1,350 kg, strong limbs, horns straight In front, the color of the mahogany robe (mahogany), around the nose an open ring, the cows are long-lived (average 9-10 years) (Trela J., *et al*, 2000). The average slaughter weight is about 620 kg, with a slaughter yield estimated between 62-64%, the meat/bone ratio is 5.5 / 1. Of the total weight, about 80% is muscle tissue, almost 10% fat, and about the same amount of bone. The meat

¹ "Ion Ionescu de la Brad" University of Life Science Iasi, Romania

is distinguished by the fineness of the muscle fiber, optimal marbling, aroma highly appreciated by consumers and the color is not very intense.

MATERIAL AND METHOD

Investigations regarding the nutritional quality of milk from Limousine cows were carried out between February and August 2021, on samples collected from the Farm: Gheliuc Mihai, Marginea Commune, Suceava County, traditional farm with a population of 62 animals (adults and youth): 10 females, 4 males, purebred limousine, imported from France (2015-2016), 48 female and male youth animals obtained on the farm.

The investigations were carried out to establish the degree of freshness, integrity and we monitored some physical-chemical and hygienic parameters of the raw material milk. Sampling was done directly from the collection vessels after milking and filtration mainly in the hot season, and their processing was done in the Food Control Laboratory of the Faculty of Veterinary Medicine Iasi, where a number of 38 milk samples were processed.

Raw milk must comply with the limits of physicochemical parameters imposed by current legislative requirements, with reference to the degree of freshness, fat content, protein content, lactose, non-fat dry matter, pH, acidity, degree of impurity, number of somatic cells.

The acidification of milk is due to the fermentation of lactose under the action of the enzymatic equipment of lactic bacteria, with the formation of lactic acid. At the reception, the acidity of the milk, according to the regulations of the whole country must be between 15-19°Thorner (°T).

The principle of the method is to neutralize the acidity of the milk with a solution of NaOH n / 10, in the presence of phenolphthalein as an indicator.

Determination of density - according to STAS 6352 1 -88 follows the principle of the method is the ratio between the weight of a volume of milk at 20° C and the weight of the same volume of water at a temperature of 4° C.

Thermolactodensimeter, clean and dry, is introduced into the milk up to the 1.0300 division, then it is allowed to float freely, taking care not to come into contact with the walls of the cylinder. Wait 1 minute and read the density value (Bondoc I. *et al*, 2002).

Determination of fat content - barometric method with Gerber butyrometer, and the principle of the method is to dissolve and mineralize protein and calcium phosphates in milk using sulfuric acid; the release of fat by breaking the protein coat of the globules with the help of isoamyl alcohol and the separation of the liquid fat in the column by centrifugation.

The determination of NTGMA was performed by determining the number of microorganisms with the colony counting method obtained at 30°C in accordance with the requirements of SR ISO 4833/2003.

The determination of coliform bacteria was done according to SR ISO 5541-1 / 1994, the method allows to count the colonies at 30°C by establishing the number of colonies. The probable number of coliform bacteria is a very important hygienic-sanitary indicator, and their confirmation is made by the fermentation of lactose.

E. coli was determined by determining the number of presumptive *E. coli* colonies with SR ISO 725/96.

RESULTS AND DISCUSSIONS

The use of unhealthy and intact milk is a major risk. Due to its complex chemical structure and composition, it is an excellent nutrient medium for various microorganisms (bacteria), which influences the quality and healthiness of milk.

The major role in obtaining a milk raw material of the quality imposed by the Regulations of the European Union is attributed to the growth system but also to their health.

The processors of cow's milk want the appearance of the milk from the animals to be homogeneous, the milk to be opalescent, without clots and flakes. The opacity changes in the sense of decreasing it when the animals are fed with juicy fodder, green fodder, or in some contaminations of milk with proteolytic flora (Willis G. L., 1983). Milk from animals treated with antibiotics is not used in processing to obtain dairy products. Abnormal milk, milk with organoleptic defects caused by animal feed, viscous, skimmed, or mucilaginous, and bitter milk are excluded from processing.

From the point of view of organoleptic characteristics in terms of appearance, color, odor, and taste, the milk samples showed a white color with a yellowish tinge, an opaque and homogeneous appearance, with a sweet taste and a perceptible odor specific to the species (Bondoc I., *et al*, 2002, Bondoc I., 2007).

In a number of 8 samples, the milk showed changes in appearance, impurities due to non-compliance with milking hygiene, fragments of fodder or feces, insects (table 1)

Table 1

Investigations regarding the organoleptic characteristics of Limousine cow's milk

Year	Seson	Number of analyzed samples	Organoleptic aspects	
			Conforms	Non conforms
2021	Warm seson	38	30	8
			78.94%	21.05%

Investigations into the quality of cow's milk were aimed at determining freshness (acidity), fat content, and density.

The data on the acidity of cow's milk showed from a number of 38 samples analyzed 4 samples had an acidity range between 22 -24^oT,

and the rest being with an acidity of less than 20^o T. The density data indicate a number of 2 samples had a value of less than 1.028 and the rest between 1.028– 1.033. An overall average of fat was 3.6% with ranges of 2.8% and 4.5% (table 2).

Table 2

Investigations regarding the physicochemical parameters of cow's milk – Limousine breed

Year	Seson	Number of analyzed samples	Physicochemical parameters (Milk acidity))		Physicochemical parameters (Milk density)	
			Conforms	Neconforms	Conforms	Neconforms
2021	Warm seson	38	34	4	36	2
			89.47%	10.52%	94.73%	5.26%

The microorganisms present in milk are characterized by a double origin, namely by the mammary origin (intravital contamination of milk) and by the extramammary origin during the obtaining, handling, and processing of milk (Gibbons J. *et al*, 2010).

Impurities found in milk often come from the animal's body: particles of feces, soil, vegetables, hairs, they are loaded with many microorganisms and reach the milk during milking, especially manual milking, in wide-mouthed vessels.

Microorganisms carried by objects that contaminate milk do not disperse immediately into the milk mass, so it is recommended that the milk be filtered into tightly closed containers

immediately after milking (Bondoc I., *et al*, 2002, Bondoc I., 2007).

Objects used for milking, including those used for mechanical milking, are the most important source of contamination. The importance of this contamination lies firstly in its massiveness, in case of hygiene negligence, and secondly, in the fact that it is mostly made with adapted microorganisms, in the phase of logarithmic multiplication, which resumes their activity. as soon as they reach the milk. Many of these microorganisms are true lactic acid bacteria and pseudolactic bacteria of the genera *Escherichia* and *Enterobacter*.

Microbiological investigations aimed to determine the parameters NTGMA / ml, coliforms /ml, and *Escherichia coli* / ml (table 3).

Table 3

Limousine cow's milk microbiological parameters

Year	Number of analyzed samples	Microbiological parameters					
		NTGMA/ml		Coliform/ml		E.coli/ml	
		Conforms	Neconforms	Conforms	Neconforms	Conforms	Neconforms
2021	38	27	11	30	8	34	4
		71.05%	28.94%	78.94%	21.05%	89.47%	10.52%

The

Numerous studies show that careful washing and disinfection of used objects significantly reduces the microbial load of milk.

Water can be an important source of milk contamination. Impure water, used to clean containers and equipment that come in contact with milk, can contaminate it with large amounts of microorganisms.

Among the *Enterobacteriaceae*, an important role is played by coliform germs, as microorganisms indicative of the hygiene used to obtain and process milk.

CONCLUSIONS

Hygienic requirements regarding the concept of food safety and food traceability led to the choice of the research topic, cow's milk being a product in high demand by consumers.

The Limousine breed is spread on all continents in 64 countries, and Romania will be the 65th country in which it is trying to adapt this breed of cattle.

The main objective of this project is to observe the adaptability of the Limousine breed to the geo-meteorological conditions recorded in northern Romania, the Bukovina region.

The Limousine breed with high body weight and long-distance travel in the case of free housing makes milking difficult and difficult to achieve. The breeder has never harvested milk from cows to collect and process milk.

Another important factor that prevents milking is the feeding of calves with milk for up to 8-10 months, the entire amount of secreted milk being strictly intended for raising calves.

Investigations into organoleptic characteristics have shown the importance of not milking constantly and lack of milking hygiene. This is also reflected in the microbiological investigations carried out on the milk samples.

The acidity investigations revealed a number of 4 non-compliant samples. Further analysis found that the samples came from animals with subclinical mastitis.

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