

THE DYNAMICS OF MILK PRODUCTION IN MONTBELIARDE BREED ON A FARM IN SOUTHERN ROMANIA

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Abstract

The Montbeliarde breed became known in Romania after 2009 when several animals from France were imported. This breed is robust, has easily adapted to the growing conditions in Romania and the milk has a special quality. This study was conducted in the Didactic Farm Moara Domnească on a number of 25 dairy cows during 2017-2018. The quantitative and qualitative parameters of milk production were analyzed, based on records on the farm, as well as periodical analysis reports.

Key words: milk, Montbeliarde breed, farm.

INTRODUCTION

Milk is a very important food product due to its complex chemical composition, biological value and high digestibility. It contains more than 100 substances needed by the human body: all 20 amino acids, 10 fatty acids, 25 vitamins and 45 mineral elements.

This is a product of great socio-economic importance, essential for the physical and intellectual development of the individual, as well as for maintaining the health of the population.

Beside ensuring the smooth growth and development of mammals, milk is a perfect antidote for adults who perform work activities in toxic environments. Regular milk consumption allows the body to dispose of any and all toxic wastes that may have been deposited in the human body during the hours of exposure to the toxic environment.

Expressed in calories, the nutritional value per one liter of milk is equivalent to: 400 g pork; 750 g beef; 7-8 eggs (Georgescu et al., 2000, 2009).

Currently and in perspective, as a result of the growth rate of the human population and the surging preferences for food products of animal origin, the main purpose of cattle breeding is the continuous and sustained increase of milk and meat production.

The history of the Montbeliarde breed is linked to the beginning of the 18th century, namely when a series of farmers from the present-day territory of Switzerland settled in France, in the France Comté region, bringing along their cows. As a result of a methodical process of selection of specimens from this cattle population, they began to participate in various exhibitions under the name of Montbeliarde (after the name of the main city in the department of Doubs, in the region of France Comté). Montbeliarde is a mixed breed, being deemed the most advanced breed for milk production within the Simmental family.

The Montbeliarde breed is part of the Simmental breed group, specializing in dairy production. Formation of this breed has gone through a comprehensive process improvement from one generation to another (Vidu et al., 2014). In these successive stages, Red Holstein participated (below 25%) in improving the amount of milk in the Montbeliarde breed. This breed is characterized by: large body development, differentiated according to sex (body weight, 600-750 kg cows and 1000-1200 kg bulls) (Bugeac et al., 2013).

24% of respondents to a survey conducted in 2012, in Western France, said that the Montbeliarde breed is robust and its health problems are reduced compared to the two other breeds in the region, namely Prim

Holstein and Normande. This breed has a low predisposition to metabolic disorders, such as milk fever and displaced abomasum, as well as mastitis.

The share of mastitis in the three breeds studied in the region has shown that it doubles in the Holstein and Norman breeds, compared to Montbeliarde. Costs for veterinary services are 34% lower in the Montbeliarde breed.

In terms of the breeding activity, the Montbeliarde breed recorded the lowest consumption of semen doses per one gestation (1.8), compared to the Norman breed (2 doses of semen per gestation) and Holstein (2.2 doses /gestation).

The average Calving Interval is 402 days, 38 days less than in the Holstein breed (www.montbeliarde.org).

In Romania, almost all species of farm animals have been and are bred. Of all these, cattle breeding is a highly important production branch of agriculture, as it provides the highest volume of products of animal origins that humans need, respectively the highest share of raw material for the food industry.

In recent years, there has been an intensification of Romania's participation in international trade, so that the area of utilization of cattle breeding is gradually expanding so as to provide as large quantities as possible, demanded by both the internal and external markets.

As for our country, Montbeliarde breed became known in Romania after 2009 when several specimens from France were imported. This breed is robust, has easily adapted to the conditions in Romania and the resulting milk is highly qualitative.

In 2010, the Moara Domneasca Didactic Farm of the University of Agronomic Sciences and Veterinary Medicine in Bucharest imported from France 20 heifers, which calved in the following 3-4 months on the farm. The cows adapted to the conditions of our country and performed very well, especially in milk production, considering the difference of habitat between France and Romania. The imported primiparous cows exceeded by far the performance of local cows and were comparable to cattle breeds such as Holstein, red or black variety. The studies conducted on the first lactation highlighted the following

results: the average duration of lactation was 289 days, and the average milk production was 6921 liters of milk, compared to France's national average of 6671 liters of milk (Vidu et al., 2010).

MATERIALS AND METHODS

This study was conducted in the Moara Domneasca Didactic Farm on a number of 27 dairy cows during 2017-2018. The quantitative and qualitative parameters of milk production were analyzed, based on the farm records, as well as on the periodical test reports.

Located in the Plain of Vlasia, the territory of the Moara Domneasca farm is a subunit of the Romanian Plain. The locality of Moara Domneasca is located in the Southeastern part in the transition zone from steppe to forest steppe, latitude 44°30' North and longitude 29°31' East, at an altitude of 90 m above sea level. The climate is temperate with harsh winters, when the average temperature of the coldest month drops below -3°C, and the warmest month has an average temperature higher than + 10°C; summers are hot, with the average temperature of the hottest month exceeding 22°C.

The dairy cows are housed during the stalling period in a barn updated in 2010, with free stalls. The animals benefit from a sleeping area fitted with a rubber mat. During summers or when the weather is fine, the animals are taken to the pen.

The feeding technology is not seasonally differentiated, each age category receiving feed ratios in accordance with physiological and production needs.

The milk produced by farm is sold directly via 2 milk vending machines or is used for the preparation of fresh cheese.



Figure 1. Image of the Moara Domneasca Cattle Farm

Table 1 shows that dairy cows represent 43% of the total cattle number. Heifers are used for the selective replacement, and the redundancy is capitalized at various farmers.

Table 1. Herd structure in the Moara Domnească farm

Age category	Heads	Percentage of the total number of cattle
Dairy cattle	27	42.86
Heifers	8	12.7
Young females 12-18 months	4	6.35
Young females 6-12 months	0	0
Young females 3-6 months	5	7.94
Young male 3-6 months	4	6.34
Young females 0-3 months	2	3.17
Young male 0-3 months	5	7.94
Beef	8	12.7
Total	63	100

RESULTS AND DISCUSSIONS

Dairy cows farm University of Agronomic Sciences and Veterinary Medicine of Bucharest are kept in loose housing, are milked twice a day herringbone milking parlor. Cows receive one type of ration every season. A cow receives 6 kg alfalfa hay, 10 kg of corn silage, 5 kg concentrate feed and 6 kg straw.

In 2017 the farm produced 121.19 tons of milk, which was used as follows: 64.5% was sold as fresh milk through dispensers, 9.2% was used for the feeding of calves, 25.4% turned into cheese and 0.8% was distorted because the quality was not good (Table 3).



Figure 2. Image from the milking stalls

Table 2. Table title example that should be replaced with your information

Parameter	n	$X \pm Sx$	V%
Duration of lactation (days)	25	295.14±2.41	8.5
Quantity of milk per total lactation (kg)	25	5916±172.01	18.2
Quantity of fat (kg)	25	261.12±5.11	18.54
Quantity of protein (kg)	25	223.57±5.02	18.75
Fat %	25	3.81±0.03	15.11
Protein %	25	3.23±0.1	17.21

The analysis performed on 25 lactations completed in the period 2017-2018 revealed the following: the total lactation duration was, on average, 295 days, with a relative low variability of 8.5%.

The total lactation in the analyzed cows was 10 days shorter than normal lactation. The amount of milk per total lactation reached an average value of 5,916 kg of milk, with a slightly higher coefficient of variability, respectively 18.2%.

This variability is explained by the fact that the study analyzed lactations in cows during various lactation stages.

Figure 3 presents the dynamics of milk production per each cow for one year. The graphical representation illustrates that milk productions are lower in July, August and October. This lower value of milk production is caused by the fact that several cows are at the end of their lactation period, when the total production decreases physiologically. The highest average monthly production is obtained in December-January, when cows are in the ascending phase of lactation.

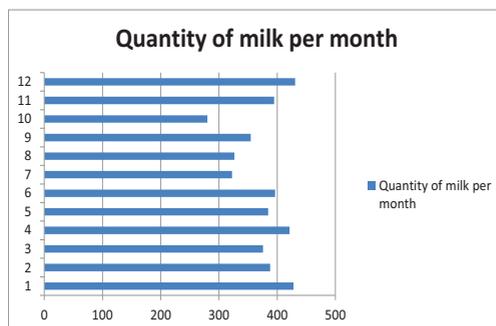


Figure 3. Milk quantity per cow / month in 2018

As for the supply of milk dispensers, Table 3 shows that consumption is lower during summertime, a significant share of the milk production being processed into cheese. As for the consumption of whole milk for feeding of calves, a sinuous evolution is noticed, depending on the suckling phase they are in. It is worth noting that the calves on the farm are fed with whole milk, not with milk substitute. Furthermore, 972 kg of milk are not intended for human consumption as a result of drug residues that are present in this milk.

Table 3. Capitalization of milk in 2017

Month	Produced milk	Milk for dispenser	Milk for calves	Milk for cheese	Altered milk
01	11308	6743	2469	2096	
02	10812	8041	1302	1469	
03	13067	7977	1440	3576	332
04	12093	7779	1386	2928	
05	11874	8135	459	3280	
06	11437	7735	482	3220	
07	10810	5938	786	4086	
08	10482	5003	1189	3970	320
09	9849	5056	868	3925	
10	8694	6065	400	1909	320
11	5380	5062	42	276	
12	5380	4535	437	408	
Total	121186	78069	11260	31143	972

A higher quality of milk is a permanent concern of farmers because it is base for setting the purchase price of raw material milk.

Table 4. Physical properties of milk

Indicator	Average values in milk
Density la 20 °C	min. 1.030 g/100g
Dry substance	min. 12.4 g/100g
Specific heat	0.93 cal/g.degrees
Freezing point	-0.555 °C
PH	6.6-6.8
Acidity (Thorner degrees)	16
Index of refraction (20 °C)	1.35

The physical properties of milk are important mainly for processing (Table 4). For example, the freezing point is important to control the

counterfeiting of milk by addition of water, to detect milk-soluble impurities, to indirectly estimate milk's fat content (a high percentage of fat determines the decrease of the freezing point).

The microbiological analysis of milk can offer valuable information on the hygiene conditions in stalls, respectively during milking, on the conditions under which the primary treatment of the milk is made and on the health of the animals.



Figure 4. Housing of dairy cows in the Moara Domneasca farm

The experience of farmers and researchers in the industry has proven, without any doubt, that where the teats of cows are not cleaned before starting milking (washed and mandatorily dried with a single-use towel), where the milking teat cups and the tubes through which milk flows inside the milking device, as well as the containers used to collect milk (collection tank, buckets, etc.) are not washed first with cold water, then with hot water and detergent and mandatorily disinfected with water and chlorine, the total number of germs (TNG) has a steep increase in fresh milk. If such milk, which has been contaminated with germs during milking, is kept at room temperature (20°C), then the number of germs will increase to such extent that it will shortly exceed the

standard of milk quality. Since a very large share of the germs collected from teats or skin and especially from the milking tools are germs who like the milk nutrients (especially lactose), their activity will cause the physical and chemical alteration of milk components to such a large extent that it can no longer be used into processing high quality dairy products.

Table 5. Evolution of TNG and NCS in 2018 in the milk produced in the Moara Domneasca farm

Month	TNG (ufc/ml)	NSC (/ml)
01	9.0x10 ⁴	214000
02	8.5 x10 ⁴	134166
03	8.2 x10 ⁴	141666
04	8.5 x10 ⁴	136000
05	8.5 x10 ⁴	129666
06	8.3 x10 ⁴	133833
07	8.4 x10 ⁴	144000
08	8.1 x10 ⁴	132000
09	8.5 x10 ⁴	135000
10	8.7 x10 ⁴	440000
11	8.1 x10 ⁴	170000
12	8.8 x10 ⁴	123000
Media	8.46x10 ⁴	169444

Table 5 shows that the total number of germs was not exceeded during the year of 2018, which brings additional safety to milk quality, especially since it is also marketed in a non-pasteurized form by milk vending machines. As for the number of somatic cells (NSC), we find that the maximum permitted value (400000 nsc/ml) was exceeded in one month only (October 2018). Figure 5 illustrates the evolution of the number of somatic cells in 2018.

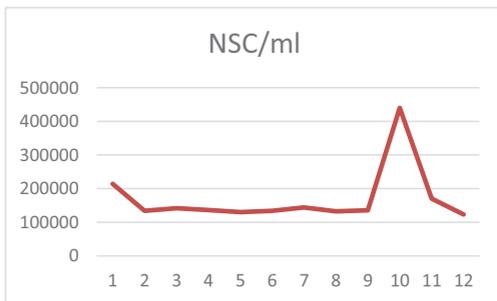


Figure 5. Evolution of the number of somatic cells in 2018

CONCLUSIONS

The Montbeliarde breed has universal importance, especially for milk production, but can also produce good results in meat production. The state of health of the Montbeliarde breed is very good, the breed adapts easily to environmental conditions and does not require special care. The quality of milk is high, consumers preferring milk from this breed.

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