

## OPPORTUNITY TO USE MONTBELIARD BREED IN BULGARIA

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### Abstract

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Montbeliard breed is new for Bulgaria. The first heifers were imported to the country in 2005, the total number of the imported animals reaching to 1339 in 2012. The present study summarizes the first results of the use of Montbeliard breed in Bulgaria. 1171 cows after their first lactation, from 16 different farms, were included in the study. 938 of the first-calf cows were born in France and 233 in Bulgaria. It was established that Montbeliard breed maintained comparatively high level of productivity under the conditions of Bulgaria. The average 305-day lactation yield of the first-calf cows was 5454±54.7 kg, the milk fat being 3.912±0.017% and the protein content – 3.396±0.011%, and, the whole lactation yield was 6393 kg, the milk fat 3.957% and protein 3.424%, respectively. The farm, the year and month of calving and the country of origin had significant effect on all the studied characteristics of milk productivity. The animals born in Bulgaria had lower 305-day lactation yield (by 10.4%,  $P < 0.001$ ), slightly lower milk protein content and higher fat content. Their lactation period was by 19.98 days longer ( $P > 0.05$ ) compared to the prolonged lactation period of the animals born in France (378.1±9.11 days). The study showed that initially the efforts should be directed towards optimizing the raising conditions for the young animals, with the aim of achieving better results in using Montbeliard breed in Bulgaria.

*Key words:* Montbeliarde; Bulgaria; milk production; influence

### Introduction

Montbeliard breed was officially recognized by the Ministry of Agriculture of France and was registered in the official register of breeds in 1889. The same year a Studbook was recorded and the records of milk production, which today continues to be one of the main criteria for selecting the breed, originated in 1923. (History of the Montbeliarde Breed, 2013)

In France, Montbeliard is the second in distribution species in the country, as over the past 20 years the number of livestock bred has increased by 37%. The reason is the combination of qualities that meet the requirements of French farmers, on the breeding efficiency – high milk yield with excellent quality milk for cheese production, good carcass meat quality and good functional properties.

The average milk yield of the cows in 305-day lactation is 7486 liters with 3.9% fat and 3.45% protein substances (MUK, 2012). The milk of Montbeliard is used to produce one of the most famous cheeses of France-Comté, as the annual supply of cheese on the domestic and foreign markets is over 45 000 tons.

Montbeliard has good meat yield qualities. Calves are fattened to 650-750 kg live weight as the average daily gain is 1.200 – 1.300 kg. The carcass rate of yield of cows is 52-54%, and of fatted calves – 56-58%, the meat is without excess fat. Carcasses are classified mainly in class R according to the EUROP system.

Of the functional features basic of the breed are fertility, longevity, exterior and resistance of animals to mastitis. In a comparative study of the contents of somatic cells in milk, Bytyqi et al. (2010) found that their number is the lowest in

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cows of Red Holstein breeds, followed by Simmental, Montbeliard, Black Holstein and Brown cattle breeds.

For Bulgaria Montbeliard is a new breed and to the present moment studies on its use have not been made. The purpose of this study is to determine the levels of indicators on the main selection feature of the breed – milk production.

## Material and Methods

The study includes 1171 cows with a complete first lactation, bred in Bulgaria in the period from 2005 to 2012. Cows are from 16 farms located mainly in lowland regions of the country. Some of the cows (n-938) were born in France and were imported as heifers with an established pregnancy, while the remaining (n- 233) were born in Bulgaria. The first data on milk production in the country date back to 2005. To breeding activity with the breed is performed by the “National Association of the Breeders of Montbeliard and Simmental Cattle in Bulgaria” (NABMSCB), under which control in 2013 there are 1 500 cows of Montbeliard breed.

The milk production control of is carried out by A4 method of ICAR, and the quality indicators of milk is determined in an independent dairy laboratory, owned by the state Executive Agency for Selection and Reproduction in Animal Breeding.

When processing the data we used multifactor dispersion analysis as the linear model had the following statistical type:

$$Yijklmn = \mu + YCi + MCj + Fk + Ol + Sm + eijklm(n);$$

where: Yijklmn – surveillance vector;  $\mu$  – overall average constant; YCi, MCj, Fk, Ol, Sm are fixed effects correspond-

ing to the year of first calving ( $i = 8$ ), month of first calving ( $j = 12$ ), farm ( $k = 16$ ), place of birth ( $l = 2$ ), father ( $m = 249$ ) included as a regressor; eijklm (n) – residual variance.

## Results and Discussion

The first import of cattle from Montbeliard breed in Bulgaria was made in 2005, when 138 pregnant heifers were imported from France. From this period to 2012 a total of 1339 heifers were imported, the main import is in 2007 – 689 pieces. In 2007 the breeding organization for the breed (NABMSCB) was established and was granted a license to conduct breeding, which officially started its activity in 2009. Currently under selection control are over 90% of farmed animals in the country – 1 500 cows bred in 21 farms.

In the Bulgarian conditions Montbeliard shows relatively high milk production. For the study period, 305-day (normal) lactation is  $5454 \pm 54.7$  kg with milk fat of 3.91% and a protein content therein – 3.40% (Table 1).

The milk yield of Montbeliard in Bulgaria is far from the registered average milk yield of controlled cows in France for 2012 – 8379 kg for full lactation and 7209 kg for a 305-day lactation with a fat content of 3.86% and a protein content of 3.42% (FGE, 2012) but it is relatively high in Bulgaria. Thus, according to data of breeding organizations, in 2011 the average milk yield of the controlled population of the black and white cattle is 5312 and 6454 kg, with a fat content of 3.68 and 3.90% and a protein content in milk 3.30 and 3.33% for both breeding organizations, respectively. In

**Table 1**  
**Indicators of milk production in cows Montbeliard grown in Bulgaria**

Indicators	Total		Including born			
	LS	± SE	France		Bulgaria	
			LS	± SE	LS	± SE
Comprehensive lactation						
Duration of lactation, days	388.1	7.267	378.1	9.109	398.08	10.345
Milk yield, kg	6393	113.6	6586	142.4	6199	161.7
Fatty substances, %	3.957	0.017	3.916	0.021	3.998	0.024
Milk fat, kg	252.7	4.771	257.7	5.981	247.7	6.792
Protein substances, %	3.424	0.011	3.431	0.014	3.419	0.016
Milk protein, kg	219.2	4.151	226.4	5.202	212.1	5.908
For normal lactation (305 days)						
Milk yield, kg	5454	54.65	5753	68.51	5156	77.81
Fatty substances, %	3.912	0.017	3.871	0.021	3.953	0.024
Milk fat, kg	212.4	2.191	221.6	2.746	203.2	3.118
Protein substances, %	3.396	0.011	3.401	0.014	3.391	0.017
Milk protein, kg	185.1	1.977	195.7	2.476	174.4	2.814

brown cattle, for the same year, the milk yield of evaluated cows was 4855 kg with 3.84% fatty substances.

Full lactation milk yield in the study animals is significantly higher (with 17.2%), than the normal lactation milk yield, due to the hugely extension of the lactation period (LS =  $388.1 \pm 7.3$  days). Extending the lower milk yield period in the end of lactation (16.4 kg average daily full lactation milk yield compared to 18.1 kg for the normal), is probably the cause of a higher (though insignificant) content of fat and protein in the full lactation milk compared to the normal.

According to data of OSM (2010), the duration of the first lactation of cows of Montbeliard breed in France is on average 294.45 days, as a low volatility of 5.52% is reported. Maciuc et al. (2010) have observed highly extension of lactation in the breed in Romania. With 60 first-calf heifers, the duration of lactation was  $417.8 \pm 14.9$  days; the average lactation milk yield was  $6984.8 \pm 236.8$  kg, with a fat content in milk  $3.84 \pm 0.029\%$  and a protein content of  $3.31 \pm 0.012$ . Indicators for the normal (303 – day) lactation were 5727 kg, 3.84% and 3.31%, respectively.

Farms in Bulgaria have faithfully ( $P < 0.001$ ) differed on all indicators of milk production in Montbeliard (Table 2) as in the individual farms the normal lactation milk yield ranges from 4569 to 6488 kg, the fat content in milk from 3.62 to 4.11%, and the protein content – from 3.29 to 3.55%.

The difference in the amount of milk butter between farms reaches 49.7%, and the amount of dairy protein to 45.0%.

Individual variation in the indicators of a 305-day lactation is relatively low – for milk yield – CV = 12.94%, for fat content in milk – CV = 5.84% and protein content – CV = 4.64%. Insignificantly higher is the variation in complex in-

dicators – milk butter,kg (CV = 13.15%) and milk protein,kg (CV = 13.62%). In separate individuals the duration of lactation varies from 237 to 967 days, the lactation milk yield from 1966 to 16527, for normal lactation – from 1966 to 9210 kg, the content of fat in the milk – from 2.86 to 4.92%, the protein content – from 2.58 to 4.76%.

Over the years the normal lactation milk yield of controlled cows has varied from 5170 to 6100 kg, the fat content of milk from 3.78 to 4.06% and the protein content in it from 3.30 to 3.44%.

\*\*\* $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$

The productivity of cows born and raised in France is higher than those born in Bulgaria. From them, for normal lactation is obtained 11.6% more milk, 12.2% more milk protein and 9.1% more milk butter, in 2.07% lower content of fat in milk.

Taking into account the population size, the milk yield of cows imported from France can be qualified as good. In examining the milk yield of 20 cows imported into Romania as heifers from France and bred in an experimental farm Vidu et al. (2011) have found that the average first lactation milk yield of the cows is  $6086.6 \pm 266.93$ , with a fat content of milk 3.72% and a protein content in it – 3.31%. Bugeac et al. (2013) have found similar milk yield (6036.12 kg) for full (309.6 days) lactation in other 89 cows imported from France to Romania. The authors reported that the fat content of milk varied in the range of 2.12 – 6.69%, the protein content of 2.30 to 4.45% and casein – from 1.71 to 3.40%.

The background of the lower milk production of cows born in our country, they impress with a highly extended lactation period. They have been milked 20 days longer than cows born and raised in France. This is probably related to

**Table 2**  
**Influence of some factors on milk production of cows in Bulgaria**

Indicators	F – criteria and level of reliability				
	Farm	Origin	Month of calving	Year of calving	Sire
Comprehensive lactation					
Duration of lactation, days	7.015***	2.361	2.226*	4.909***	1.396
Milk yield, kg	5.748***	3.623*	2.220*	4.664***	0.108
Fatty substances%	10.141***	6.951**	1.431	10.857***	9.956**
Milk fat, kg	6.265***	1.365	2.010*	4.761***	0.23
Protein substances, %	9.150***	0.273	0.91	3.736***	5.9
Milk protein, kg	6.271***	3.759*	2.005*	3.881***	0.019
For normal lactation (305 days)					
Milk yield, kg	21.658***	37.381***	6.957***	6.503***	1.272
Fatty substances, %	12.996***	7.239**	1.799*	8.404***	7.938**
Milk fat, kg	29.247***	22.119***	5.395***	3.254**	0.016
Protein substances, %	9.742***	0.186	1.075	3.687***	3.374*
Milk protein, kg	25.156***	36.271***	5.675***	3.769***	0.161

the extension of the service period and the deterioration of fertility in general.

The results of our study confirm the good adaptability and high productivity of the Montbeliard breed outside the range of its creation, pointed out by many authors. Thus, in the study of the milk production with 200 cows of Montbeliard breed in Poland, Gołbiewski and Brzozowski (2008) have found that the average milk yield of cows in first and second lactation is 5693 kg, with a fat content of milk 4.31% and protein content – 3.56%. In Kosovo (Bytyqi et al., 2010) the average daily milk yield of Montbeliard breed was 18.7 kg, being second only to the Black Holstein breed (18.92 kg), and was higher than that of the Red Holstein (17.8), Brown Swiss (17.64), Simmental (17.85) and Tyrolean Grey (12.34). High milk production has been recorded in Montbeliard breed in Morocco (Boujenane and Aïssa, 2008), where of 319 cows, for 1148 lactations the average of 5617 kg of milk with 3.81% fat is milked. Even in the conditions of Northern Iran (Behmaram, 2010), Montbeliard breed cows have had high milk yield – from 4050 kg with first-calf heifers to 5149 kg in the maximum 4<sup>th</sup> lactation.

The reason for the lower milk yield and the impaired reproductive performance of Montbeliard breed cows, born and raised in Bulgaria, is probably to be sought in the traditional underestimation of caring for young animals in our country (Nikolov et al., 2012). Obviously, to achieve better results from the use of the breed it is necessary first to focus on optimizing the conditions for rearing young animals.

## Conclusion

In the context of Bulgaria, the French Montbeliard breed has a relatively high productivity. Average (LS) milk yield of first-calf heifers for 305-day lactation is  $5454 \pm 54.7$  kg, with a fat content of milk  $3.912 \pm 0.017\%$  and a protein content –  $3.396 \pm 0.011\%$ , and for the full lactation respectively – 6393 kg, 3.957% and 3.424% .

The farm, the year and month of calving and the country of birth have credible effect on all studied parameters of milk production.

Animals born in Bulgaria has had a lower milk yield for 305 days (10.4%,  $P < 0.001$ ), a low protein content and a higher fat content in milk ( $P < 0.01$ ) compared to those born in France.

The lactation of Montbeliard breed cows in Bulgaria is highly extended ( $388.1 \pm 7.27$  days), as with those born in

Bulgaria, it is 19.98 days ( $P > 0.05$ ) longer than that of those born in France.

To achieve the best results from the use of Montbeliard breed in Bulgaria it is necessary first to focus on optimizing the conditions for rearing young animals.

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