MONTBELIARD BREED IN EASTERN ROMANIA

V. Maciuc[1], Şt. Creangă[1], M. Schutz[2], M. Russel[2], V. Ujică[1]

[1]U.S.A.M.V. Iaşi
[2]Purdue University, Indiana, USA
e-mail: vmaciuc@yahoo.fr

Abstract

The research was carried out on 60 Monbeliard cows imported near Birlad area, - East part of Romania. Because the race is bred for the first time in this area and for it productive value we desire to study the condition of exploitation, animals' ascendancy, productive performances and genetic determinism for some characters. The herd is hosted in a freestall barn. Inside the barn is split in 3 areas: lying area, feeding area and movement area. The lying area have individual stall. Feeding takes place by a system with individual feeding area. Milking takes place in a herringbone milking parlour. Analyzing cows ascendancy, result good productive performance for mothers with an average of 8494.2 kg milk, 3.85% fat, 330.02 kg pure fat and 280.78 kg pure protein. Paternal grandmothers had more good performance then mothers (11256.10 kg milk, 3.86 % fat, 433.35 kg pure fat respectively). The cows' performance in the first lactation, per 305 days, was a medium of 5727 kg milk with 3.84% fat and 3.31% protein. Per total lactation, the average of productive performance was 6984.87 kg for milk, with limits between 4083 and 9153 kg. The fat and protein content in milk are strong genetically determinate (h^2=0.57; h^2=0.63). The quantitative milk production, the fat quantity and protein quantity have low to intermediate genetically determinism (h^2=0.27 – 0.30).

Key words: race, Montbeliard, Romania, ascendancy, production

INTRODUCTION

Montbeliarde breed, known under the French name of French milk Simmental, is famous for its exceptional qualities such as: a special genetic value for milk and meat, adaptability to the various environment conditions, superior turning to account of food and reduced specific consumptions, organic resistance and productive longevity etc.

The specific growing conditions, in the areas it comes from, are characterized by altitudes of 400 and 1000 meters, a continental climate, rapid changes of temperatures ranging between +35°C in summer and - 20ºC in winter. The natural conditions gave the breed a remarkable resistance and made possible its spreading all over the world, including our country.

The breed was imported in the eastern area of Romania, near Bârlad town, Vaslui County. The highest altitudes of the hills around the town vary between 264 - 311 m. The climate is temperate continental with harsh winters and dry and hot summers. For a longtime, the region was considered as lacking the resources capable to develop and sustain a relevant economic life. There are no data on the genetic value and morphoproductive characters of Mondbeliarde bovines from this area, a reason why our team started researching the existing nucleus.

MATERIAL AND METHOD

Researches were effectuated on 60 Montbeliarde cows that ended their lactation and for which we analysed the following characters: exploitation conditions, animal ancestry, milk production indices, regression coefficient with regression line and genetic determinism (h^2) of some characters. The data were taken from observations and direct determinations on the farm and the primary data bank of the farm and O.A.R.Z. Vaslui (Office for Melioration and Reproduction in Animal Science, Vaslui). All data were taken over statistically $\overline{X}$, $\pm s_{\overline{x}}$, s, V% and synthesized in tables and diagrams. When establishing the heritability coefficient, we

used R.E.M.L. method (Restricted Maximum Likelihood). This relies on an iterative process of maximization of a function **(**P. M. VanRaden and al. [7]**).** The calculation techniques vary depending on the optimization algorithm chosen, but all of them need BLUP solutions for every iteration cycle, for different effects of the model. A large number of iterations are necessary to reach convergence, but this cannot be avoided if someone wants an efficient evaluation. They usually accept a as convergence criterion a difference between the solutions resulted from the last and before last iteration smaller than a percentage from the average value registered for the respective indicator.

The biometric model used (Maciuc V. [4], [6]) has the following form:

$J_{ijkl}=\mu+F_i+L_J+A_k+e_{ijkl}$

where:

J_{ijkl}=performance "l" of individual "k" achieved during lactation "j", on farm "i",

μ =general average,

F_I=farm effect "i" (steady factor); i=1.

L_j=effect of lactation rank "j" (steady factor); j=1.

A_{ik}=additional genetic effect of individual "k"; (random factor).

e_{ijkl}=error associated to every measured performance.

This is a mixed model since it comprises a random factor (the animal) and two steady factors (farm and lactation rank).

RESULTS AND DISCUSSIONS

The shelter (fig. 1) is a free maintenance one, enclosed with four walls, large sliding doors communicating with the paddock. In the interior arrangement of the shelter, one may see three functional areas, namely: a rest area, a walking area and a feeding area. (Maciuc V. [5]).

Fig. 1 Aspects from the inside of the shelter

The rest area is an individual space separated from the walking area by a threshold 20 cm high. The sleeping boxes are made of metal bars 2.2 m long and 1.15 m wide. On the bottom part of the sleeping box there is a metal bar 0.9 m high, that forces the animal, when going from bedsore to sitting, to step back and defecate outside the sleeping box. As litter, they use a layer of straws that is periodically changed. The walking area is 3 m wide for animals' circulation. The evacuation of dejections is made by means of a hydraulic scraper. Feeding takes place by means of a metal grid separating the feeding front. Concentrates are fed in a rationed manner in specially arranged boxes. The milking of the cows takes place in a special milking room of "herringbone" type.

Table 1
Average values and estimates of variability of production characters for the ancestry of Mondbeliarde breed from eastern Romania

Statistics / Ancestry	U.M.	$\overline{X}$	$\pm s_{\bar{x}}$	s	V%	Min	Max
M - Milk	Kg	8494.2	193.43	1059.51	18.36	5321	12.158
M - Fat	%	3.85	0.06	0.34	8.83	2.90	4.40
M - Fat	Kg	330.02	13.79	41.67	21.53	202	475
M - Protein	%	3.28	0.03	0.18	5.70	2.90	3.70
M - Protein	Kg	280.78	12.44	32.20	21.96	187	431
MM - Milk	Kg	8559.6	360.27	1072.05	21.87	5617	13.111
MM - Fat	%	3.85	0.06	0.34	8.83	2.90	4.40
MM - Fat	Kg	334.46	13.79	41.67	21.53	202	475
MM - Protein	%	3.28	0.03	0.18	5.70	2.90	3.70
MM - Protein	Kg	283.75	12.44	32.20	21.96	187	431
MT - Milk	Kg	11256.1	532.85	1068.80	24.59	8103	18.030
MT - Fat	%	3.86	0.06	0.34	8.83	2.90	4.40
MT - Fat	Kg	433.35	13.9	41.67	21.53	202	475
MT - Protein	%	3.29	0.03	0.18	5.70	2.90	3.70
MT - Protein	Kg	349.20	12.44	32.20	21.96	187	431

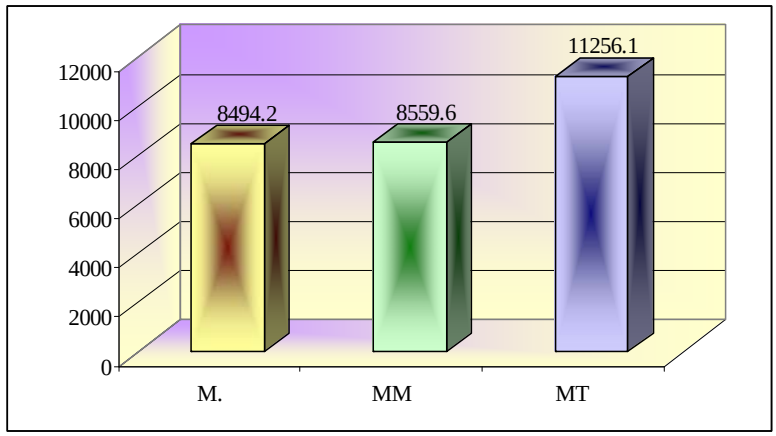

Fig. 2 Milk quantity for the ancestry of Mondbeliarde breed under study

Analyzing the value of ancestry for the ancestry of Mondbeliarde breed form eastern Romania (tab. 1 and fig. 2) one may notice that cows came from mothers with an average performance of 8494.2 kg of milk, 3.85 % fat, 330,02 kg of pure fat and 280.78 kg of pure protein. Paternal grandmothers (MT) registered superior performances than mothers (MM) having average values of 11256.10 kg of milk, 3.86 % fat, 433.35 kg of pure fat, and there is the possibility to obtain some young bulls with a superior genetic potential.

The average production performances (tab. 2) for the 1st normal lactation were 5727 kg of milk, with 3.84% fat and 3.31% protein. Per total lactation, the average production was 6984.87 kg of milk ranging between 4083 and 9153 kg. At the same time, the fat quantity per normal lactation was

197.91 Kg and the protein quantity was 179.85 Kg. Considered as a whole, the population is heterogeneous for the quantitative features of milk production having variability between 15 and 21 %. We must underline the good productive level of this lactation, with melioration possibilities through selection and use of a seminal material with an acknowledged genetic value (E. E. Wildman et al. [2]).

Table 2
Average values and estimates of variability of production characters for Mondbeliarde breed from eastern Romania

	Statistics	Total lactation					
		Number of days	Milk kg	% fat	Kg fat	% prot.	Kg. prot.
1st lactation	n	60	60	60	60	60	60
	$\overline{X}$	417.78	6984.87	3.84	256.6	3.31	226.79
	$\pm s_{\bar{x}}$	14.853	236.818	0.029	8.43	0.012	7.692
	s	70.735	978.925	0.18	32.647	0.072	48.039
	V%	24.112	21.481	4.815	20.517	2.196	21.182
	Min	301	4083	3.6	154.3	3.23	121.5
	Max	567	9153	4.3	352.6	3.45	306.7

Table 2 continuation

	Statistics	Normal lactation					
		Number of days	Milk kg	% fat	Kg fat	% prot.	Kg. prot.
1st lactation	n	60	60	60	60	60	60
	$\overline{X}$	303.00	5727	3.84	197.91	3.31	179.85
	$\pm s_{\bar{x}}$	0.736	67.566	0.025	2.937	0.009	2.359
	s	8.13	453.25	0.17	19.7	0.061	15.824
	V%	4.69	14.84	4.539	13.265	1.846	9.316
	Min	301.00	4083	3.6	154.3	3.23	121.5
	Max	305.00	6366	4.3	274.2	3.45	237.4

The regression coefficient between the milk quantity for normal lactation and fat % is given in table 3 and the regression line in presented in fig. 3. We may notice a negative and weak correlation of – 0.250. As for the regression coefficient between the milk quantity for normal lactation and the fat quantity, the correlation is positive and strong of 0.983 (tab. 4 and fig. 4). The same aspects are also highlighted in case of regression between the milk quantity and protein.

Table 3
Regression coefficient between the milk quantity for normal lactation and fat %

Specification	Standardized coefficients		Regression coefficient	t	Sig.
	B	Survey error			
(Constant)	10994.657	3271.875	-.250	3.360	.001
L1NG (Fat %)	-1613.566	874.033		-1.846	.071

a Dependence on milk variable Kg (L1N)

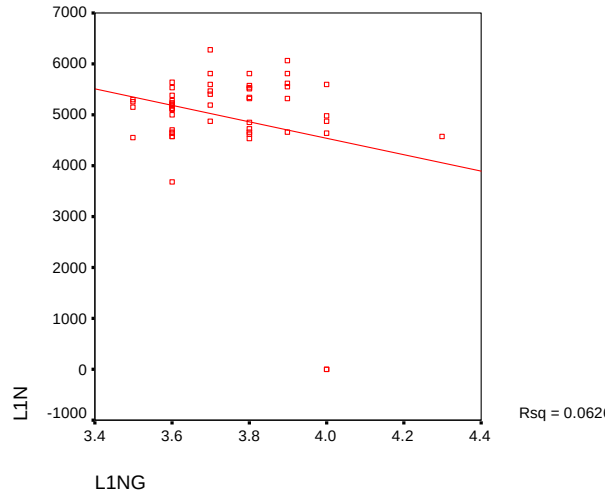

Fig.3 Regression line for the milk quantity for normal lactation and fat **%**

Table 4
Regression coefficient between the milk quantity for normal lactation and fat Kg

Specification	Standardized coefficients		Regression coefficient	t	Sig.
	B	Survey error			
(Constant)	198.565	128.389	.983	1.547	.128
L1NG (Fat Kg)	25.712	.676		38.012	.000

a Dependence on milk variable Kg (L1N)

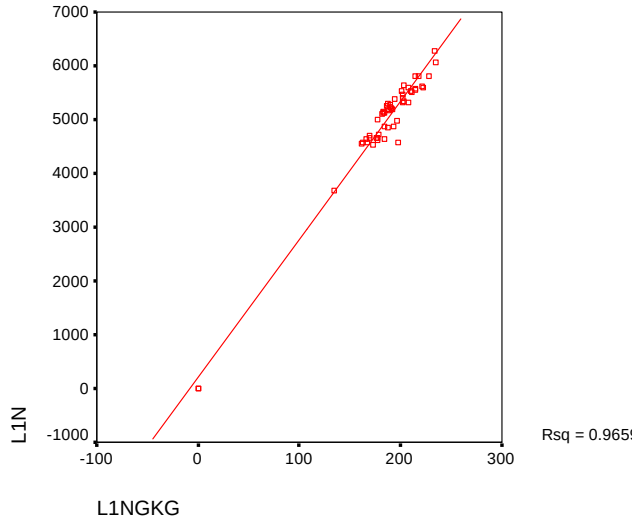

Fig. 4 Regression line for the milk quantity for normal lactation and fat Kg

The value of the heritability coefficient allows us to infer the participation rate of genotype in the formation of phenotype and has a great importance in the practice of animals' melioration. For this reason, they elaborated different methods to establish the value of h^2, methods using the data of production control by the selection units. The safest methods to estimate the genetic parameters rely on an iterative process of maximization of a function.

The analysis of the heritability coefficient (tab. 5 and fig. 5) highlights interesting aspects for Montbeliarde breed from eastern Romania. Thus, the milk quantitative production, the pure fat quantity, and the protein quantity during lactation have a weak genetic determinism. (h^2 = 0.23 – 0.30 %), so the characters in question are less genetically consolidated. We must mention the superior values of heritability for the fat content (h^2=0.63) and milk protein (h^2=0.57).

Table 5
Values of heritability coefficient for the main productive features, for the 1st normal lactation, for Montbeliarde population from eastern Romania

Character	Heritability	Total variance	Interclass variance	Intraclass variance
Length of normal lactation (305 days)	0.23	616.48	522.32	646.36
Milk kg	0.27	2371088.57	1105698.97	1130028.72
Fat %	0.63	0.09	0.06	0.11
Fat kg	0.30	4058.13	2089.96	2036.04
Protein %	0.57	0.03	0.02	0.01
Protein kg	0.28	2442.14	1266.03	107.61

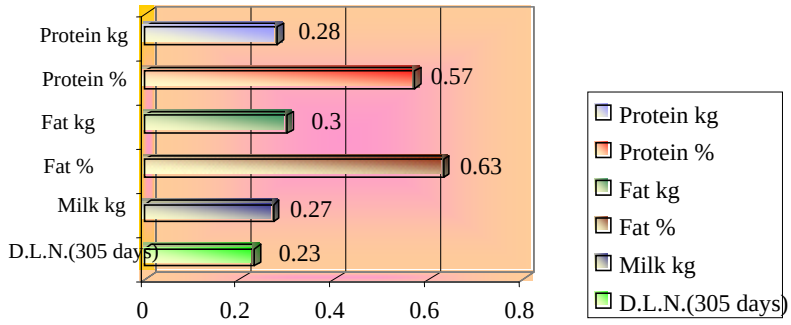

Fig. 5 Values of heritability coefficient for the main productive features

The increase of the genetic potential and productivity of the bovine population (Bronnimann R. et al. [1], E. E. Wildman et al. [2], J. W. West [3]) concomitantly with the optimization of technologies, management and correct economic administration represent important ways to enhance the profit-making milk and meat production.

CONCLUSIONS

1. Montbeliarde breed under study has a good productive level (5727 kg of milk, with 3.84% fat and 3.31% protein, during the 1st normal lactation) with real possibilities to increase the genetic potential by selection and use of valuable seminal material.

2. The regression coefficient is strong for the milk quantity and fat quantity 0.983% and a strong genetic determinism of 0.67% for fat Kg and 0.57% for protein Kg.

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