THE HERITABILITY STUDY OF THE CHARACTERS FOR DEVELOPMENT, REPRODUCTION AND MILK PRODUCTION AT THE ACTIVE RSC POPULATION FROM THE BUCHAREST AREA OF MILK SUPPLY

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Abstract

This paper presents RSC characteristics regarding heritability parameter for the development, reproduction and milk production at the Pantelimon and Afumati farms. The milk production is the main target when we follow the goal of milk production exploitation from those two farms. To determine the heritability of morphologic characteristics and capability for the mechanic milking, it is obvious the milk cows from the group of study have a level of genetic determination for waist between 43% at Pantelimon farm and 35% at Afumati. So, they are fitting under variability limits of heritability coefficient. A higher heritability value to the entire population in this study is the height at the croup character. At the Afumati farm it was $h^2 = 0.49$ and at Pantelimon farm $h^2 = 0.47$. The milking speed represents the most important parameter to reflect the capability of the udder for the mechanic milking, the heritability coefficient being between 28% and 48%, results obtained also by the other authors. The heritability coefficient determined for the Calving interval (CI) indicate a weak genetic determination, so, at the Pantelimon farm $h^2 = 0.195$ and Afumati farm $h^2 = 0.110$. The heritability of the between birth and the service period (SP) has lower values, between $h^2 = 0.140$ at Pantelimon farm and $h^2 = 0.100$ at Afumati farm. The heritability coefficient of milk production 0.31 - 0.35 and the fat percent was 0.48-0.51. So, at the both farms, we obtained data can be compared with similar data from the profile literature.

Key words: heritability, calving interval, service period.

INTRODUCTION

Cattle are in the economy in general and agriculture in particular, an important socio-economic features that result from their main function, food function, as it provides 96% of the world production of milk, 30% of the world production of meat and over 90% of the world production of skins and directly participate in the growth, development and health insurance mankind.

This paper studies the characteristics of the Romanian Spotted Cattle breed, in terms of milk production and economic parameters in Pantelimon and Afumati farms.

MATERIALS AND METHODS

This paper presents characteristics of heritability for the development, reproduction and milk production at the RSC population from Pantelimon and Afumati farms. Milk production is the main objective pursued in milk production operation of the two farms analyzed.

Heritability (h^2) is defined by I. Lush (1941), as the proportion of the total variant which can be assigned to the medium effect of the genes, meaning the fraction of additive genetic variant and the total phenotypic variant.

The total phenotypic variant can be defined as a regression of the amelioration value to the phenotypic value, or as the square of the correlation between amelioration value and the phenotypic value.

Heritability expresses oneself in absolute values with decimals or relative.

The noteworthy and use of the heritability coefficient by E.Negrutiu is:

− The phenotype of a character is always the result of the interact between the genotype and the environment,

- The heritability value is the dependency of the entire variation components,
- The genetic components are influenced by the gene frequencies in a population and, as result, the heritability may be different from a population to another,
- Population of the animal homozygous has more hereditary conservativism, a heritability coefficient higher than heterozygotes one,
- The heritability has a practical signification in the amelioration process,
- The heritability coefficient is one of the components in all relations about prediction in an improvement of the value of cattle – index for selection, genetic progress etc.

RESULTS AND DISCUSSIONS

Heritability of the taxonomy and capability for the mechanic milking – the analysis of the quantitative characters had developed once with the progress to the scientific amelioration and creating the programs of amelioration and optimized plans of selection with the special contribute of Robertson and Rendel (1950) etc.
We are presenting below the value of the heritability coefficient at the both farms, in it ranged, from the character nature point of view (Table 1 and 2):

Table 1. h^2 coefficient values from the main morphological characters and capability for the mechanic milking to the milk cows from Pantelimon farm

Nr.crt.	Character	N	$h^2 \pm e$
1.	Size	175	0.370±0.13
2.	The height at the croup	175	0.470±0.18
3.	The oblique length of the body	175	0.570±0.16
4.	Thoracic perimeter	175	0.370±0.12
5.	The body weight	175	0.380±0.17
6.	The milking speed	175	0.480±0.18

Table 2. h^2 coefficient values from the main morphological characters and capability for the mechanic milking to the milk cows from Afumati farm

Nr.crt.	Character	N	$h^2 \pm e$
1.	Size	150	0.350±0.14
2.	The height at the croup	150	0.490±0.17
3.	The oblique length of the body	150	0.480±0.16
4.	Thoracic perimeter	150	0.350±0.14
5.	The body weight	150	0.450±0.15
6.	The milking speed	150	0.360±0.18

The height at the croup has a higher heritability value to the entire population analyzed. Thus, we calculate to the Afumati farm $h^2 = 0.49$ and to the Pantelimon farm $h^2 = 0.47$.
The oblique length of the body present the highest genetic determinism to the Pantelimon farm (57%), the value obtained being superior data from the scientific literature (44% - A. Petre).
The h^2 determined at the body weight is 0.38 l (Pantelimon farm) and 0.45 (Afumati farm).

The milking speed is the most important parameter in the measurements of the udder capability for the mechanic milking, the value of the heritability determined for the population of cows is ranged between 28% and 48%.
The reproduction characters heritability represent an important leverage which assures the safety for determination in amelioration potential of the bulls.

Table 3. The values of the heritability coefficient in main reproductive characters at the milk cows in Pantelimon farm

Nr.crt.	Character	n	$h^2 \pm e$
1.	Age of first birth	175	0.413± 0.17
2.	Calving interval (CI)	175	0.195±0.12
3.	The period from birth to fecund insemination (SP)	175	0.140±0.14
4.	Dry period	175	0.250±0.15
5.	The lactation period	175	0.225± 0.12

Table 4. The values of the heritability coefficient in main reproductive characters at the milk cows in Afumati farm

Nr.crt.	Character	n	$h^2 \pm e$
1.	Age of first birth	150	0.310±0.16
2.	Calving interval (CI)	150	0.110±0.17
3.	The period from birth to fecund insemination (SP)	150	0.100±0.14
4.	Dry period	150	0.210±0.18
5.	The lactation period	150	0.200±0.15

The age at the first birth heritability value determined in this study is fitting in the medium to intense characters genetic determinate group, making a fine precision for the selection of this character.

The period heritability between birth and the first fitting fecund (SP) at the milk cows population in this study has small values, ranged between $h^2 = 0.140$ (Pantelimon farm) and $h^2 = 0.100$ (Afumati farm) with a genetic determinism small grade and impossible to be significant improve through amelioration.

The value of the heritability coefficient for the milking period to the analyzed population is 0.225 to Pantelimon farm and 0.200 to Afumati farm. The value of this indicator is at an inferior level for the middle characters genetically determined, with low chances to be improved through the amelioration action. Regarding the amelioration of this character, we suggest to optimize the breeding and exploitation links of technology in both farms.

For the heritability of the milk production characters, we obtained comparative data with those results in the others authors on different RSC populations.
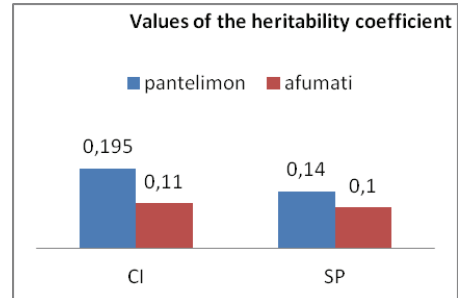

Fig.1. Values of the heritability coefficient at the Pantelimon and Afumati farms

Table 5. The heritability value for the milk production at the cows from Pantelimon and Afumati farms

Nr. crt	Farm	Milk quantity	Fat quantity	Fat %
1.	Pantelimon	0.30±0.15	0.35±0.15	0.51±0.17
2.	Afumati	0.28±0.12	0.31±0.11	0.48±0.16

About the heritability of the fat quantity, we obtained results at the middle of those obtained by others authors.

The heritability of the fat percent has a very high value on both farms, which is characteristic for a pronounced genetic determinism and, at the same time, indicates the efficiency of amelioration factors in the improvement of fat quantity to the RSC population.

Table 6. The comparative range of h^2 milk production characters
On analyzed population by lactations sequence

Nr.crt	Farm	Milk quantity			Fat quantity			Fat %		
		I	II	III	I	II	III	I	II	III
1.	Pantelimon	0.30± 0.17	0.21± 0.11	0.25± 0.15	0.39± 0.16	0.48± 0.10	0.24± 0.17	0.48± 0.14	0.53± 0.15	0.45± 0.12
2.	Afumati	0.31± 0.13	0.28± 0.18	0.26± 0.16	0.35± 0.12	0.30± 0.12	0.30± 0.17	0.48± 0.10	0.52± 0.14	0.46± 0.12

CONCLUSIONS

Analyzing the dynamic heritability of milk production characteristics to the RSC population we found that:

- h^2 of milk quantity has the high value at the first lactation after that is decreasing,
- h^2 of fat quantity has the higher value at the second lactation to the Pantelimon farm,
- at the both farms, h^2 of the fat percent has a slow increasing to the second lactation.

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