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STUDY REGARDING THE GENETIC DETERMINATION OF MILK PRODUCTION

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Abstract
The study of the genetic determinism of some characters in Romanian piebald cattle is based on the date obtained from the age of first calving. Population was consisted of 61 cows belonging to 12 families of parental half-sisters. The characters that have been studied were: age of first calving, amount of milk from first lactation, proportion of milk fat, amount of fat from milk. The method used to assess the genetic determinism is based on the ANOVA variance analyze and correlation between studied characters.

Key words: cows, lactation, genetic determination

INTRODUCTION

Knowing the genetic determinism is, as well known, the primarily element for taking any decision regarding genetic amelioration of animal populations. The proceeds, use today for knowing the genetic determinism of characters in different populations belonging to different species, are very various, and so the results are divers and sometimes in contradiction.

MATERIALS AND METHODS

The study was made using the performances obtained at first lactation in a population of Bălţată Românească. There have been studied 61 cows belonging to 12 families of parental half-sisters, calculating an average of 5.083 cows/ family.

The characters that have been studied were: age of first calving, amount of milk, proportion and amount of fat from milk.

The research method used was the statistical study using the ANOVA program and the analysis of the correlation between studied characters.

RESULTS AND DISCUSSIONS

Heritability. First, there have been registered the values of phenotypic variances, inter and intra familial, as seen in table 1.

Table 1

Values of inter, intra familial and total variances

Character	Interfamilial variance	Intrafamilial variance	Total variance
Age of first calving	3.207	10.402	13.610
Amount of milk	145283.999	1017990.836	1163274.835
Proportion of fat	0.002	0.030	0.032
Amount of fat	169.752	1487.703	1657.455

Interfamilial variances are places at 23.56% for age of first lactation, 12.48% for the amount of milk, 7.05% for the proportion of fat milk and 10.3% for the amount of fat. Based on the variances, there have been estimated the values of heritability for the four studied characters. The values are presented in table 2.

Table 2

Values of heritability

Character	$h^2 \pm s_h^2$
Age of first calving	0.942±0.706
Amount of milk	0.449±0.525
Proportion of milk fat	0.282±0.436
Amount of milk fat	0.409±0.488

In the studied populations, 3 of the characters have a high genetic determinism, expressed through 0.4 to o.9 values. For a single character (proportion of milk fat) the genetic determinism has a medium values – 0.282, that doesn't integrate itself in the limits indicated by the literature.

Characters interdependence. The characters interdependence was evaluated by using phonotypic, genotypic and environmental correlations. There have been established 4 couples of characters: age at first calving and amount of milk, amount of milk and proportion of milk fat, amount of milk and milk fat.

To estimate the correlations, the inter and intrafamilial phenotypic covariance, the values are presented are presented in table 3.

Table 3

Values of the inter and intrafamilial phenotypic covariance

Couples of values	Cov_f	Cov_l	Cov_i
Age at first calving x amount of milk	765.097	137.477	627.620
Amount of milk x proportion of milk fat	-18.124	-6.846	-11.287
Age of first calving x proportion of fat	-0.095	0.071	0.166
Amount of milk x amount of milk fat	42913.86	4932.58	37081

Using the results from tables 2 and 3, there have been established the phenotypic, genotypic and environmental correlations, and the values are presented in table 4.

Table 4

Phenotypic, genotypic and environmental correlations values for the studied characters

Couples of values	$r_f \pm s_{rf}$	$r_g \pm s$	r_m
Age at first calving x amount of milk	0.192±0.127	0.201±0.123	0.207
Amount of milk x proportion of milk fat	-0.093±0.127	- 0.373±0.111	0.018
Age of first calving x proportion of fat	-0.142±0.126	0.830±0.040	-0.965
Amount of milk x amount of milk fat	0.977±0.006	0.993±0.002	0.973

Analyzing the correlations in table 4, it can be observed that the phenotypic correlation between age of first calving and the amount of milk is poorly positive (0.192), with a stronger genotypic and environmental correlation (0.201; 0.207).

Between milk amount and milk fat proportion there is a negative phenotypic and genotypic correlation (0.092; 0.373) and a poorly positive environmental correlation (0.017±0.129).

Between age of first calving and milk fat proportion there is a negative phenotypic and environmental correlation (-0.142±0,126; -0.965±0.008) and a highly positive genotypic correlation (0.830±0.040).

Between milk amount and milk fat amount there is a highly positive phenotypic, genotypic and environmental correlation (0.973±0,005; 0.993±0.002, 0.973±0,007).

CONCLUSIONS

In the studied population, 3 characters have a genetic determinism of heritability higher then 0.4. Percentage of fat has a medium genetic determinism (0.282±0.436).

Between age of first calving and the amount of milk there are intermediary positive phenotypic, genotypic and environmental correlations (0.192±0.124; 0.201±0.123; 0.207±0.123).

Between milk amount and milk fat proportion there is a negative phenotypic and genotypic correlation (0.092; 0.373) and a poorly positive environmental correlation (0.017±0.129).

Between age of first calving and milk fat proportion there is a negative phenotypic and environmental correlation (-0.142±0,126; -0.965±0.008) and a highly positive genotypic correlation (0.830±0.040).

Between milk amount and milk fat amount there is a highly positive phenotypic, genotypic and environmental correlation (0.973±0,005; 0.993±0.002, 0.973±0,007).

REFERENCES

1. Creangă Şt., Cîrlan M., 2006 - Ereditate si variabilitate, vol.I. Editura Alfa – Iaşi.
2. Creangă Şt., 1999 - Elemente fundamentale ale eredității animale. Editura Ion Ionescu de la Brad, Iaşi.
3. Dinescu, S.si col., Cresterea vacilor pentru lapte, Ed. Ceres, Bucuresti, 1997
4. Mărgărint I., 2001, Bazele morfofiziologice ale producției de lapte, Editura Vasiliana 98, Iaşi;
5. Nistor, G., E. Nistor, Zootehnie specială, Ed. Agroprint, Timisoara, 2002
6. Oroian, T., D. Dronca, 2005, Valori genetice şi selecția la animale, Ed. Mirton, Timişoara
7. Pipernea N.,1974, Ereditatea principalelor caractere şi însuşiri la animalele domestice, Editura Didactică şi pedagogică Bucureşti.
8. Popescu-Vifor St., 1978, Genetică animală. Editura Ceres. Bucureşti
9. Popescu-Vifor St., M.Georgescu, A.Giurcă, 1991, Studiul comparativ al determinismului genetic al unor caractere la doză populații de taurine de rasă Brună. Lucrări Ştiințifice I.A.N.B., Seria D, vol. XXXIII-XXXIV, pg. 18-26,
10. Sandu Gh., 1968, Modele experimentale în zootehnie. Editura Carol Sanivet. Bucureşti