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GENOTYPIC PARAMETERS OF MILK PRODUCTION IN PRIMIPAROUS DAIRY ROMANIAN SPOTTED BREED FROM RESEARCH STATION AND AGRICULTURE DEVELOPMENT LOVRIN –TIMIŞ COUNTY

PARAMETRII GENOTIPICI AI PRODUCŢIEI DE LAPTE LA VACILE PRIMIPARE, RASA BĂLŢATA ROMÂNEASCĂ, DE LA STAŢIUNEA DE CERCETARE ŞI DEZVOLTARE AGRICOLĂ LOVRIN JUDEŢUL TIMIŞ

NISTOR GH.*, NISTOR ELEONORA *, BAMPIDIS V.**
**Faculty of Agriculture, Timişoara, Romania*
***Institute National Agricultural Research Foundation, Giannitsa, Greece*

In a herd of 117 Romanian Spotted breed primiparous cows, from the Research Station and Agriculture Development Lovrin –Timiş County, the heritability and phenotypic correlations for milk production, milk fat yield and milk protein yield were estimated. For milk fat and milk protein yield, the heritability was 0.75 and 0.88 respectively, which means that these characters can be selected together. For milk production the heritability value was only 0.31. A positive and very high correlation was registered between milk production and milk fat production, +0.97. Between milk production and milk protein production the correlation was also high and positive +0.83, with a very close value of the correlation between milk fat production and milk protein production, +0.86.
Key words: milk, milk fat, milk protein, correlation, heritability.

Introduction

Milk has been used for human consumption for thousands of years. Today cow's milk is one of the most popular animal milks consumed by humans. Nutrition of the dairy cow affects the yield and proportion of milk components.

Through the diet, the mammary gland is supplied with blood components to synthesize milk. Non-nutritional factors such as heredity, days in milk, parity and infections, number of secretory cells, as well as temperature and humidity often overshadow nutritional effects.

To produce maximum milk yields, dairy cows are pushed to their physiological limits through a combination of selective breeding, high-protein feeds, and the latest

technology. Milk quantity and quality from each individual depends on: genetics, milking method and equipment, transport, dairy cow age, milking frequency in 24 hours, mammary repose, nursing length, season and dairy cows' health. Whole milk is the milk as it came from the cow's udder and contains about 3.5%-4.2% milk fat.

Materials and Methods

Researches were carried out on 117 primiparous cows herd, belonging to Romanian Spotted breed, from Lovrin Research Station and Agriculture Development –Timiş County.

For the genotypic and phenotypic parameter calculations Statistics for Windows vrs 4.5.A and Microsoft Excel vrs.2002 softwares were used.

The phenotypic correlations for each studied trait, phenotypic variance (S^2x, S^2y) and the variance among each couple of traits (Sxy) were calculated.

Results and Discussions

Heritability for the milk production in the effective herd was 0.32 (Table 1). Those values indicate that from the total phenotypic variance in the studied population, the additive genotypic variance is about 32%, while 68% belong to the non-additive genetic variance and environmental conditions.

Heritability value of 0.32 is included among the normal values for this parameter in the literature, among 0.30% and 0.35%.

Milk fat production had a heritability of 0.76 (Table 1). This value is also included in the literature data, where normal is situated between 0.68 and 0.78.

Table 1

Heritability for the characters in Romanian Spotted Breed primiparous dairy cows from Lovrin

Parameters	Heritability
Milk yield	0.32
Fat yield	0.76
Protein yield	0.87

For the milk protein production, heritability in the primiparous dairy herds was 0.87. This heritability value proves that this trait is established in 87% by the genetic additive interactions, and the remainder of 13% to non-additive genetic interactions and environmental conditions.

The literature indicates that heritability of this trait is situated roughly around 0.70, which means that the result obtained by us is a higher value.

For the selection efficiency, which is equal with $1/\sqrt{n}$, where "n" represents the number of traits, the value and the sign of phenotypic correlations among the analyzed traits were estimated.

In selection, for the strong and positive correlated characters, it can be take only one character, the other one will be selected naturally. Genetic improvement is slower when selection is made for more than one trait at a time. A breeding program must place emphasis on selection for the most economically valuable traits.

Table 1

Correlations for the couple of characters in Romanian Spotted breed primiparous dairy cows from Lovrin

Parameters	Milk production	Milk Fat production	Milk Protein production
Milk production	1.00	+0.91	+0.82
Milk Fat production	+0.91	1.00	+0.85
Milk Protein production	+0.82	+0.85	1.00

Phenotypic correlations between milk production and milk fat production in the first lactation of the Romanian Spotted breed dairy cows, is positive and very high, +0.91. The higher the heritability, the faster the genetic progress in improving this trait is.

Between milk production and milk protein production correlation indicate a value of +0.82, which it is a high and positive correlation.

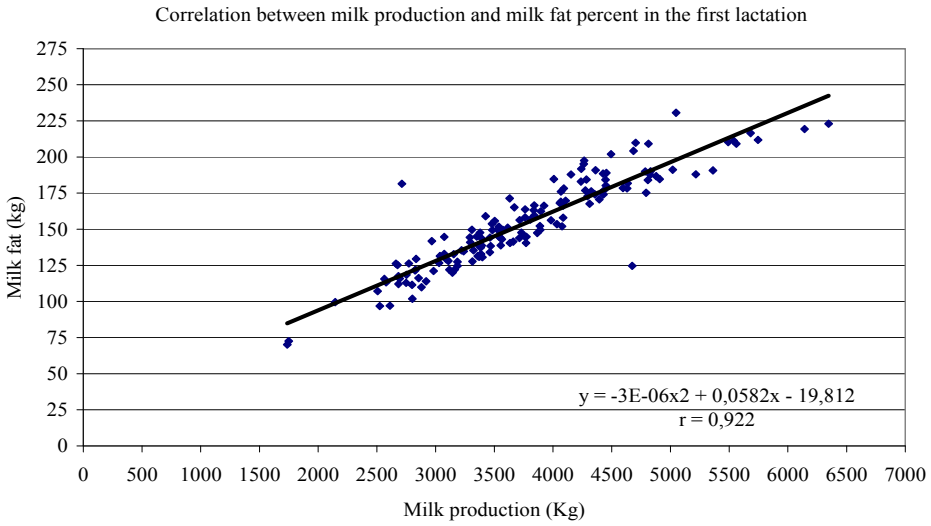
Correlation between the third couple of traits: milk fat production and milk protein production, has a positive high value of +0.85.

The regression curve for each couple of traits was used in order to establish among which of the analyzed traits there is a better correlation which can be used in the selection program for the Romanian Spotted breed dairy cows.

In the first diagram, the equation of the regression curve is rendered, where the independent variable (x) is represented by milk production, while the depended variable is milk fat production.

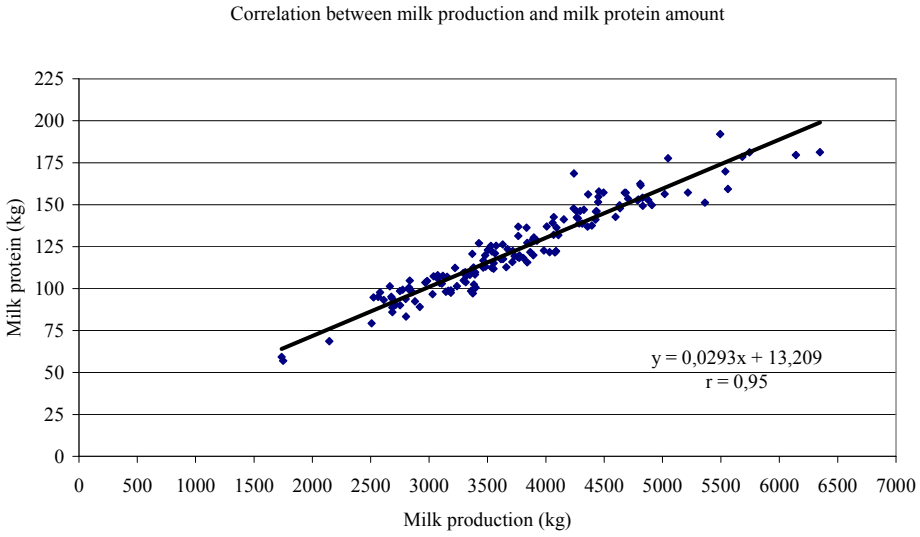
After the calculation of the regression function differential we find out that for a milk production of 9700 kg, the milk fat production can be roughly 262.458 kg. These results indicate that the Romanian Spotted primiparous dairy cows herd from Lovrin has a great productive potential for which can be obtained such milk fat production.

Graph 1



In the second diagram the regression curve and equation between milk production and milk protein production is illustrated.

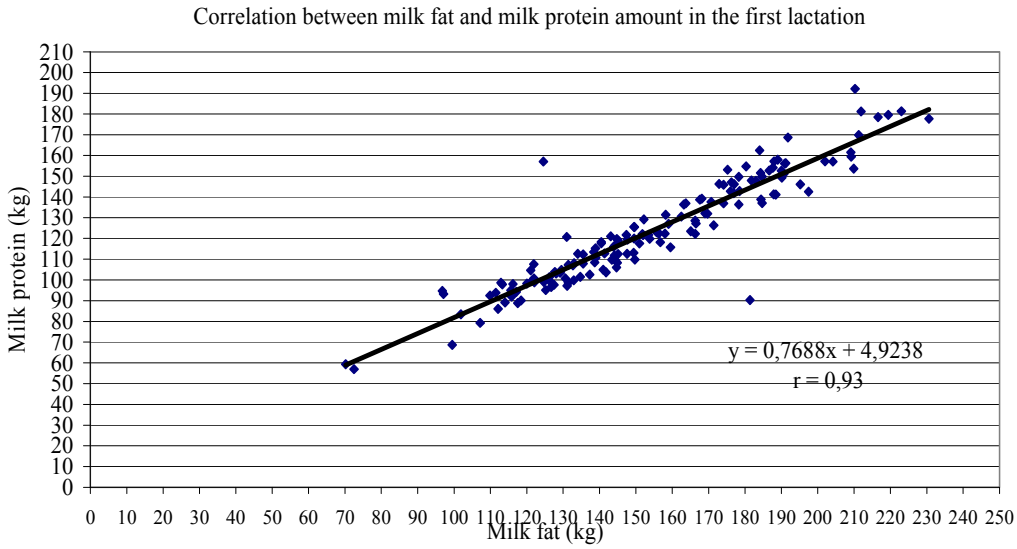
Graphic 2



An improved milk production is an important objective in selection. The regression function differential indicates that the value of both traits in the primiparous dairy cows is good enough for these effective herd to be accepted in the nucleus of selection or to obtain an ideal milk protein production of 424.700 kg. For such milk protein production, theoretically, the milk production has to be 10.725 kg. This diagram also shows that the milk protein production grows simultaneously with the milk production, until the maximum of 10.725 kg.

Regression curve and the differential equation for the milk fat production, respectively milk protein production, are rendered in the third diagram.

Graphic 3



Values obtained for this couple of traits indicates that the highest milk protein production of 422.106 kg can be obtained when an ideal milk fat production obtained would be of 472.66 kg.

Conclusions

1. From data results that for two of the three analyzed traits, there is a high heritability: +0.76 for the milk fat production and +0.87 for milk protein production. It means that both characters can be improved by selection.
2. As a result of the investigations, it comes out that there is a very high and positive correlation, between milk and milk fat production, +0.98.

3. Between milk and milk protein production the correlation was high and positive with a value of +0.82, as well as the correlation between milk fat and milk protein productions, +0.85.
4. Making evidence the positive correlations among the analyzed couple of traits, it is an instrument for the dairy breeders to make a better and efficient selection.

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NISTOR GH*., ELEONORA NISTOR*, V. BAMPIDIS**
**Faculty of Agriculture, Timişoara, Romania*
***Institute National Agricultural Research Foundation, Giannitsa, Greece*

La un efectiv de vaci aflate la prima lactaţie din rasa Bălţata Românească, de la Staţiunea de Cercetare şi Dezvoltare Agricolă Lovrin, judeţul Timiş, s-au estimat heritabilitatea şi corelaţiile fenotipice pentru producţia de lapte, cantitatea de grăsime şi cantitatea de proteină din lapte. Atât pentru cantitatea de grăsime cât şi pentru cea de proteină din lapte, heritabilitatea a fost de 0,76 şi respectiv 0,87, ceea ce înseamnă că ambele caractere pot fi selecţionate simultan. Pentru producţia de lapte heritabilitatea a fost de 0,32. O corelaţie pozitivă şi foarte mare s-a înregistrat între producţia de lapte şi cantitatea de grăsime de 0,98. Între producţia de lapte şi cantitatea de proteină corelaţia a fost de asemenea pozitivă şi ridicată, de +0,82, având o valoare foarte apropiată de cea a corelaţiei dintre cantitatea de grăsime şi cea de proteină din lapte de +0,85.
Cuvinte cheie: lapte, grăsime, proteină, corelaţie, heritabilitate.