THE GENETIC DETERMINISM OF ECONOMICAL TRAITS IN A SWINE PATTERN LINE

POPA RĂZVAN ALEXANDRU, POPA DANA, NICOLAE CARMEN, MAFTEI MARIUS, DINIȚĂ GEORGETA

Universitatea de Ştiinţe Agronomice şi Medicină Veterinară Bucureşti, Facultatea de Zootehnie, B-dul Mărăşti, nr. 59, sector 1, poparasvan@yahoo.co.uk

Abstract

The first phase in objective selection optimization is established of population genetic structure. The genetic parameters is very important in animal breeding because, according to those values, is establish the breeding system, selection objective and selection method.

Key words: animal breeding, objective selection, genetic parameters

INTRODUCTION

Establish the genetic determinism of economical traits is a very important step in animal breeding because those values are a part of all mathematical relations for breeding value and genetic gain quantification. Also, the genetic parameters value establishes the breeding system, selection objective and selection method (Drăgănescu, 1979; Popescu-Vifor Șt., 1972, 1978, 1990; Popa, 2005, 2009).

MATERIAL AND METHOD

The studied material is represented by a swine pattern line sample named LS 345 Peris. The analyzed traits are: life weight, back fat depth, % of meat, average daily gain, and average daily gain in carcass.
The variance-covariance components was estimate by REML method (Patherson and Thompson, 1971, cited by Grosu, 1995, 1997, 2003) using a sire model.

RESULTS AND DISCUSSIONS

In table no. 1 is presented the average level of performances in studied pattern line sample.
The results obtained about the average level of performances shown those are in normal limits specify for swine pattern line. A special attention must grant to high values of variation coefficients especially for back fat depth (42.74%) and average daily gain (16.47%). This results show that the selection applies until present either neglected the importance of these two traits, or it was inefficiently. So, these populations become heterogenic.

The inefficiency of selection work it is cause either to incorrect establish of selection objective, or wrong using of testing space.

Table 1

The average performances in studied pattern line sample

Traits	n	MU	Average	Standard deviation	Variation coefficient
Life weight	990	kg	85.498	12.65	14.79
Back fat depth	990	mm	10.412	4.45	42.74
% of meat	990	%	56.637	4.02	7.098
Average daily gain	990	g/day	0.431	0.071	16.47
Average daily gain in carcass	990	g/day	0.326	0.063	19.33

In table no. 2 is presented the value of variance-covariance components for the considerate traits.
The results present in table no. 2 show that the residual variance/covariance has the highest weight of total variance/covariance, for all traits.

Table 2

The value of variance-covariance components for the considerate traits

Traits/couple of traits	S_F^2 / cov_F	S_I^2 / cov_I	S_i^2 / cov_i
Life weight (A)	160.0650	26.6773	133.3877
Back fat depth (B)	19.9243	2.9343	16.9899
% of meat (C)	16.3431	2.5936	13.7495
Average daily gain (D)	0.0046	0.0007	0.0038
Average daily gain in carcass (E)	0.0038	0.0006	0.0032
A x B	26.9527	4.9916	21.9611
A X C	1.5288	-0.6103	2.1391
A X D	0.7894	0.1377	0.6517
A X E	0.7364	0.1308	0.6056
B X C	-14.4580	-2.4094	-12.0486
B X D	0.1287	0.0222	0.1065
B X E	0.1226	0.0219	0.1008
C X D	0.0106	0.0013	0.0093
C X E	0.0083	0.0004	0.0079
D X E	0.0042	0.0007	0.0035

The values of heritability are presented in table no. 3.
According to these values, the analyzed traits are classified in high heritable traits group. So, the selection method which may be applied is individual selection.

Table no. 3

The values of heritability for the considerate traits

Traits	$h^2 \pm S_{h^2}$
Life weight	0.6667 ± 0.164
Back fat depth	0.5891 ± 0.150
% of meat	0.6348 ± 0.158
Average daily gain	0.6386 ± 0.159
Average daily gain in carcass	0.6962 ± 0.169

It was determinate the phenotypic, genotypic and environmental correlations, for showing the existence of a common gene pool from polygenic complexes which determinate the analyzed traits.
The correlation coefficients values are present in table no. 4.
According to data shown in table no. 4 it can be observed that, in most cases, the correlation coefficients are intense positive, with one exception: between back fat depth and % of meat. The genetic correlation for this combination is intense negative. This negative value is benefic within swine pattern line because one of breeding goals is to increase the quantity of meat in carcass and reduce the back fat depth respectively.
It is known that the % of meat is hard determinate at live animal (precision is low) and, for this reason, the selection must be made for back fat depth (this traits is easy and precise to determinate at live animal). Beside, because exist a high negative genetic correlation between this traits, it is possible to improve indirectly % of meat by selecting back fat depth measured at live animal.

Table 4

The values of phenotypic, genotypic and environmental correlations

Couple of traits	$r_{F \pm S_{r_F}}$	$r_{G \pm S_{r_G}}$	r_e
Life weight x			
- back fat depth	0.4773 ± 0.1125	0.5642 ± 0.1210	0.4015
- % of meat	0.0298 ± 0.1222	-0.0729 ± 0.1745	0.1282
- average daily gain	0.9218 ± 0.0496	0.9820 ± 0.0063	0.8640
- average daily gain in carcass	0.9427 ± 0.0427	0.9870 ± 0.0045	0.8971
Back fat depth x			
- % of meat	-0.8002 ± 0.0768	-0.8569 ± 0.0447	-0.7445
- average daily gain	0.4295 ± 0.0116	0.4884 ± 0.1369	0.3807
- average daily gain in carcass	0.4463 ± 0.1146	0.5009 ± 0.1322	0.3984
% of meat x			
- average daily gain	0.0388 ± 0.1279	0.0290 ± 0.1763	0.0478
- average daily gain in carcass	0.0333 ± 0.1280	0.0104 ± 0.1743	0.0558
Average daily gain x			
- average daily gain in carcass	0.9933 ± 0.0148	0.9992 ± 0.0003	0.9887

CONCLUSIONS

1. The values of variation coefficients especially for back fat depth (42.74%) and average daily gain (16.47%) show that the selection applies until present either neglected the importance of these two traits, or it was inefficiently;
2. The analyzed traits are classified in high heritable traits group;
3. In most cases, the correlation coefficients are intense positive, with one exception: between back fat depth and % of meat;
4. It is possible to improve indirectly % of meat by selecting back fat depth measured at live animal.

REFERENCES

1. Drăgănescu C., 1979, Ameliorarea animalelor, Editura Ceres, Bucureşti;
2. Grosu H., 1995, Studii privind perfecţionarea metodicii de ameliorare la suine cu ajutorul metodelor moderne. Teză de doctorat, USMV Bucureşti;
3. Grosu H., 2003, Programe de ameliorare, Editura AgroTehnica, Bucureşti;
4. Grosu H., S. Lungu, V. Kremer, 1997, Modele liniare utilizate în ameliorarea genetică a animalelor, Editura Coral Sanivet, Bucureşti;
5. Popa R., D. Săndulescu, H. Grosu, V. Băcilă, 2005, Studiu privind structura genetică a liniei sintetice de suine LSP-2000, Lucrări Ştiinţifice, Seria Zootehnie, vol. 48, Editura Ion Ionescu de la Brad. Iaşi, p. 547-554, ISSN 1454-7368.
6. Popa R., 2005, Cercetări privind optimizarea unui program de ameliorare la o linie paternă de porci în condiţii de însămânţări artificiale, Teză de doctorat, USAMV Bucureşti;
7. Popa R., 2009, Programe de ameliorare, Ed. Printech, Bucureşti;
8. Popescu-Vifor Şt., 1972, Studiul parametrilor genetici ai performanţelor de reproducţie la scroafe în vederea alcătuirii unor indici de selecţie. Teză de doctorat, IANB Bucureşti;
9. Popescu-Vifor Şt., 1978, Genetica animală, Editura Ceres, Bucureşti;
10. Popescu-Vifor Şt., 1990, Genetica populaţiilor de animale domestice, EDP, Bucureşti;