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GENETIC DETERMINISM OF THE GROWING RATE AND CARCASS QUALITY IN A PIG POPULATION

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Abstract
Studying the genetic parameters presents importance for choosing selection method, breeding system and the goal objective of selection. The study was carried out on a sample from LS 345-Periş pig population consist of 2759 offspring belonging to 80 of sire families. The studied sample consist of 1443 descendants from big white breed, belonging to 50 families of semi-sisters –semi-brothers with an average size of 28,9 SS-SF. There were analyzed the following seven characters: live weight at the age of 182 days, slaughter yield, fat thickness, muscle size, lean meat percentage corrected, average daily spore per life and average daily spore in meat.
The growing and carcass traits have a genetic determinism intermediate towards intense. The heritability values range from 0,264 (back fat thickness) to 0,411 (percentage of muscle tissue). On the basis of phenotypic inter- and intra-familial variance and covariance there were estimated the phenotypic, genotypic and environmental correlation coefficients between the seven characters. Of all correlations the genetic one interests more, therefore we have insisted on the values recorded by this one. Thus, the value of this correlation between live weight and the other ones, registered positive values of over 0, 6 except the following two characters were the values were negative: muscle size and lean meat percentage.

Keywords: pig, genetic, traits, selection, parameters, optimisation, economic, efficiency, amelioration

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1. INTRODUCTION

The economic value of a character is defined by the relative effect on a global indicator (profit) given by its genetic growth with a genetic unit, the rest of the characters being constant (G. Movileanu, 2008). As the prices and the costs have a great variability in time and space, there were preoccupations on replacing the economic efficiency with the biological one. Within this context, the global indicator is represented by the maximization of the daily average rate of the meat in the carcass. (L.N. Hazel, 1943, C.R. Henderson, 1963, Şt. Popescu-Vifor, 1990; Van Vleck, 1993, H.Grosu and col., 1997)
In the present paper, the biological importance of each character was estimated by the multiple regression method, considering the daily average rate of carcass meat as the dependent variable (global indicator) and the characters such as living weight, carcass meat percentage, daily average rate and medium carcass rate, as independent variables. As the considered characters are expressed in different measure units, the partial regressions were standardized in order to obtain comparable results.
Knowing the value of the genetic characters of parameters is important in (L.R. Schaeffer, 1999):
(1) Giving priority to the genetic improvement or to the exploitation improvement in order to increase the production,
(2) The choice of improvement system,
(3) The choice of the selection method and
(4) Establishing the selection objective, hence the importance of their knowledge.

2. MATERIAL AND METHODS

The studied sample consist of 1443 descendants from big white breed, belonging to 50 families of semi-sisters –semi-brothers with an average size of 28,9 SS-SF.
There were analysed the following seven characters: live weight at the age of 182 days,

slaughter yield, fat thickness, muscle size, lean meat percentage corrected, average daily spore per life and average daily spore in meat.
Average performances of the analysed sample related to the seven characters analysed, are presented in Table 1.

Table 1. Average performances of the analysed sample

Character	UM	X +/-S	s	cv %
Live weight	kg	101,79 +/- 0,25	9,63	9,46
Yield	%	78,64 +/- 0,04	1,69	2,15
Fat thickness	mm	14,17 +/- 0,11	4,29	30,27
Muscle size	cm²	61,58 +/- 0,14	5,50	8,95
Lean meat percentage corrected	%	55,27 +/- 0, 08	3,32	6,00
Average daily spore per life	kg	0,530 +/- 0,001	0,052	9,73
Average daily spore in meat	kg	0,230 +/- 0,0007	0,027	11,62

For the estimation of variance and covariance observational components, the REML method was used (Restricted Maximal Likelihood – Patterson and Thompson, 1971).

3. RESULTS AND DISCUSSION

The observational components of the variance and covariance are presented in Table 2.
The values of the variance and covariance components which were the basis for estimating heritability and phenotypic, genotypic and environment correlations are presented in Table 3 and Table 4.
From the data presented in the above table result that for the studied sample, live weight have a strong genetic determinism (0,6), while the yield and the fat thickness have a intermediary genetic determinism (0,3-0,4). The rest of the characters have a weak genetic determinism.
On the basis of phenotypic inter- and intra-familial variance and covariance there were estimated the phenotypic, genotypic and environmental correlation coefficients between the seven characters (Table 4). Values found confirm the trend reported by other research (Gh. Sandu et al., 1983).

Table 2. The observational components of the variance and covariance of the analysed traits

Character or the couple of characters	S_F^2/cov $_F$	S_I^2/cov $_I$	Si^2/cov $_I$
Live weight (1)	93,00	14,07	78,92
Yield (2)	2,85	0,28	2,57
Fat thickness (3)	18,45	1,55	16,90
Muscle size (4)	30,35		
Lean meat percentage corrected (5)	11,01	0,33	30,02
Average daily spore per life (6)	0,0026	0,50	10,51
Average daily spore in meat (7)	0,0007	0,00014 0,00002	0,002 5 0,000 7
1x2	14,28	1,98	12,30
1x3	15,21	3,92	11,29
1x4	9,38	-0,47	9,85
1x5	-1,00	-1,74	0,74
1x6	0,38	0,04	0,34
1x7	0,17	0,009	0,16
2x3	2,56	0,54	2,02
2x4	1,71	-0,11	1,82
2x5	-0,22	-0,24	0,02
2x6	0,05	0,005	0,05
2x7	0,26	0,0014	0,26
3x4	-0,18	-0,20	0,02
3x5	-12,64	-0,84	-11,8
3x6	0,06	0,01	0,05
3x7	-0,03	0,001	-0,03
4x5	6,79	0,16	6,63
4x6	0,04	-0,002	0,04
4x7	0,05	-0,0002	0,05
5x6	-0,002	-0,0047	0,002
5x7	0,05	0,0001	0,05
6x7	0,001	0,00004	0,001

Table 3.Heritability values of the analysed characters

Character	h^2 +/- Sh^2
Live weight	0,60+/-.0,15
Yield	0,39+/-0,11
Fat thickness	0,34+/-0,09
Muscle size	0,04+/-0,03
Lean meat percentage corrected	0,18+/-0,06
Average daily spore per life	0,22+/-0,07
Average daily spore in meat	0,10+/-0,04

Of all correlations the genetic one interests more, therefore we have insisted on the values recorded by this one. Thus, the value of this

correlation between live weight and the other ones, registered positive values of over 0, 6 except the following two characters were the values were negative: muscle size and lean meat percentage.

Table 4. The values of the phenotypic, genotypic and environmental correlations between the analysed characters

Couple of characters	r_F +/- Sr_F	r_G +/- Sr_G	r_M
Live weight x			
Yield	0,88+/-0,012	0,90+/-0,025	0,82
Fat thickness	0,37+/-0,024	0,84+/-0,036	0,13
Muscle size	0,18+/-0,026	-0,21+/-0,220	0,28
Lean meat percentage corrected	-0,03+/-0,026	-0,65+/-0,081	0,19
Average daily spore per life	0,77+/-0,017	0,87+/-0,032	0,78
Average daily spore in meat	0,65+/-0,020	0,60+/-0,097	0,75
Yield x			
Fat thickness	0,35+/-0,025	0,82+/-0,011	0,18
Muscle size	0,18+/-0,026	-0,38+/-0,021	0,27
Lean meat percentage corrected	-0,40+/-0,024	-0,65+/-0,091	0,12
Average daily spore per life	0,69+/-0,019	0,87+/-0,035	0,65
Average daily spore in meat	0,61+/-0,020	0,61+/-0,011	0,64
Fat thickness x			
Muscle size	-0,07+/-0,026	-0,28+/-0,220	0,02
Lean meat percentage corrected	-0,89+/-0,012	-0,95+/-0,012	-0,88
Average daily spore per life	0,28+/-0,025	0,71+/-0,072	0,17
Average daily spore in meat	-0,22+/-0,026	0,19+/-0,031	-0,30
Muscle size			
Lean meat percentage corrected	0,37+/-0,024	0,40+/-0,234	0,38
Average daily spore per life	0,15+/-0,026	-0,25+/-0,250	0,18
Average daily spore in meat	0,32+/-0,025	-0,06+/-0,317	0,34
Lean met percentage corrected x			
Average daily spore per life	-0,01+/-0,026	-0,55+/-0,117	0,08
Average daily spore in meat	0,51+/-0,023	0,03+/-0,027	0,56
Average daily spore per life x	0,85+/-0,014	0,82+/-0,062	0,86
Average daily spore in meat			

The second character, the yield, is genetic positive correlated with fat thickness cu, average daily spore per life and average daily spore in meat.

The correlation with lean meat percentage corrected is intensively negative (-0,65).

The third character, fat thickness, appear within the two variants as being positive correlated with average daily spore while is negative correlated with muscle size and meat percentage.

Muscle size is positive correlated with lean meat percentage and negative correlated with average daily spore.

The fifth character appears to be negative correlated with average daily spore per life and independent in relation with average daily spore corrected. Average daily spore per life is positive correlated with average daily spore corrected.

4. CONCLUSIONS

Live weight has a strong genetic determinism (0,6), while the yield and fat thickness have an intermediary genetic determinism (0,3-0,4) and the rest of the characters have a weak genetic determinism.

Live weight is positive correlated with yield, fat thickness and average daily spore.

Yield is negative correlated with muscle size and lean meat percentage.

Lean meat percentage corrected appears to be negative correlated with all the characters, except muscle size.

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