

4-40 RELATIONSHIP BETWEEN POLYMORPHIC LOCI AND ACTIVITY OF SOME ENZYMES AND MEAT PRODUCTION IN SWINE

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Object of this study were daily gain, duration of fattening in days, utilization of food per kg daily gain and some slaughter traits of fattening pigs, belonging to Large White breed (Russian origin) in connection with the established genotypes of transferrins and some enzyme polymorphic loci and the level of the activity of some enzymes in the blood of examined pigs.

The aim of our experiment was to find some information about the relationship between single enzyme genotypes and above mentioned traits or relationship between the " Sum heterozygosity " (when several heterozygote genotypes from several loci are available in the blood of one pig).

In our work we used information from electroforetic typing of 94 pig, s blood samples for Tf and enzymes - Am, Acp, Acp and 6-PGD. On the other hand we used our results from spectrofotometric obtained information for the level of the activity of enzymes - Acp, GOT, GPT, CPK, PHI and Cp for the calculation of phenotype correlations between the level of enzyme activity and daily gain, carcass weight (frozen), thickness of back fat, number of the ribs, eye muscle area, percent of meat in the leg of pork.

The methods and procedures used in this work was described in other published papers (Makaveev, 1970, 1976, 1977). For the calculation of influence of various genotypes on the fattening traits variance analysis was used.

RESULTS

The results obtained in this work show us certain advantageous position of the

pigs, possessed some polymorphic genotypes in the blood. They are shown on the table 1. As we can see more strike significant advantage concerning daily gain belonged to the pigs which have heterozygote genotype Acp AB > AA > BB ($p \leq 0,01$ and $0,05$) of the polymorphic locus of the enzyme - Acide phosphatase .

Significantly lower is the consumption of food units per kilogram daily gain in direction - Acp AB < AA < BB ($p \leq 0,01$) .

Significantly higher daily gain we can see also in the group of pigs, possessed heterozygote genotype 6-PGD AB from the locus which have control over the polymorphism of 6-phosphogluconate dehydrogenase enzyme in the pig , s blood .

Higher daily gain show us and the pigs with heterozygote Akp AC genotype in comparison with the pigs possessing homozygote genotype Akp CC ($p \leq 0,05$) .

From the slaughter, s traits significantly differences were shown in the average back thickness of fat of the next order : 6-PGD AA < AB < BB ($p \leq 0,05$) . The back thickness of fat increased also in the group of pigs, possessed Akp genotypes in the order : Akp AC > CC > CE ($p \leq 0,05$) .

Less differences in eye muscle area of the various groups of pigs were not significant .

In the other experiment we have the aim to verify how far, increasing of the number of heterozygote genotypes from several loci, controlling proteins and enzymes in the blood of the pigs is connected with certain effects of heterosis towards daily gain, longivity of fattening in days and consumption of food (food units) .

By means of Varince analysis we established significant influence between increasing " The sum heterozygosity " and increasing daily gain , less consumption of food per kg daily gain and shorten the longivity of fattening period in days . Differences between the average back thickness of fat in the pigs were non significant .

On the next figure 1 are shown relationships between increasing the sum heterozygosity from 1 to 5 heterozygotes genotypes per pig, and daily gain, food units per kg daily gain and longivity of fattening period in days .

Biserial correlations between some enzyme genotypes and daily gain, food units per kg daily gain and average back thickness fat are shown in the next table 2 . We can conclude that biserial correlations between heterozygote Acp AB, 6-PGD AB and Akp AC genotypes and daily gain are positive and statistically significant . Very closed result we obtained also between heterozygote Acp AB genotype and food units. Average back fat thickness is connected in positive correlations with homozygote 6-PGD BB genotypes and heterozygote Akp AC genotype .

As we pointed out at the begining of our paper we calculated some phenotype correlations between the level of enzyme activities in the blood plasma and some slaughter, s traits in the fattening pigs. The phenotype correlations calculated are shown on table 3.

In this table we can see the positive significant phenotype correlations between the daily gain and the activity the enzymes - Alkaline phosphatase and negative also significant correlation with Glutamat oxalacetate transaminase in blood plasma .

Carcass weight correlated significantly negative with the level of Alkaline phosphatase and Creatinphosphokinase.

Average thickness of back fat correlated negative and significant with Alkaline phosphatase , Phosphoxeksose isomerase and Cp .

The number of the ribs correlated positively with the activity of enzymes - Creatinphosphokinase , Phosphoxeksose isomerase and Ceruloplasmin.

Eye muscle area of m.long.dorsi correlated negatively and significant only with the level of Alkaline phosphatase activity .

The percent of meat in the leg of pork correlated significantly positive with Cp and negatively with PHI enzymes .

In conclusion we can say that by means of information of electrophoretic phenotyping of transferrins and enzymes - Acp, 6-PGD and Akp in blood plasma samples we can have preliminary information about the better possibility for obtaining higher daily gain and better utilization of food of selected pigs during the fattening .

The complex polymorphic genotype Tf AB + Acp AB + 6-PGD AB + Akp AC will give us the best results if we use its as a markers for selection pigs for daily gain and better utilization of food .

The increasing " Sum heterozigosity ", using pigs possessed more heterozygote genotypes by polymorphic loci will help us to obtain more meat production from fattening pigs.

The levels of the activity of plasma enzymes Akp, PHI and Cp have more positive and negative significant correlations with examined slaughter, s traits than other enzymes studied .

Table 1

Fattening ability of the pigs possessed certain polymorphic genotypes in their blood .

Genotypes	n	Daily gain			Food inits			Average back			Eye muscle		
		g			kg daily g.			thickness fat			area cm ²		
		\bar{x}	\pm	S \bar{x}	\bar{x}	\pm	S \bar{x}	\bar{x}	\pm	S \bar{x}	\bar{x}	\pm	S \bar{x}
6-PGD AA	55	558,8	$\pm 11,8$		3,75	$\pm 0,08$		27,79	$\pm 0,70$		27,99	$\pm 0,68$	
6-PGD ⁺⁺ AB	36	600,1	$\pm 10,0$		3,70	$\pm 0,06$		28,51	$\pm 0,66$		29,64	$\pm 0,58$	
6-PGD BB	4	568,2	$\pm 35,3$		4,06	$\pm 0,22$		31,62	$\pm 0,11$		30,00	$\pm 1,50$	
Akp CC	74	570,1	$\pm 9,9$		3,74	$\pm 0,07$		27,98	$\pm 0,59$		28,46	$\pm 0,56$	
Akp AC	11	611,9	$\pm 17,9$		3,75	$\pm 0,14$		30,51	$\pm 0,13$		30,27	$\pm 1,09$	
Akp CE	9	566,7	$\pm 16,2$		3,80	$\pm 0,11$		27,26	$\pm 1,06$		28,73	$\pm 0,99$	
Akp AA	31	561,5	$\pm 9,4$		3,91	$\pm 0,07$		28,50	$\pm 0,48$		27,96	$\pm 0,57$	
Acp AB	42	608,5	$\pm 7,4$		3,61	$\pm 0,04$		28,85	$\pm 0,76$		29,27	$\pm 1,04$	
Acp BB	19	556,3	$\pm 9,6$		3,96	$\pm 0,08$		27,56	$\pm 0,28$		29,31	$\pm 0,72$	
Tf AA	11	579,9	$\pm 12,8$		3,79	$\pm 0,08$		29,95	$\pm 0,81$		30,39	$\pm 0,90$	
Tf AB	28	601,9	$\pm 10,11$		3,64	$\pm 0,17$		28,97	$\pm 0,65$		28,91	$\pm 0,48$	
Tf BB	55	570,5	$\pm 7,2$		3,68	$\pm 0,06$		28,01	$\pm 0,47$		28,91	$\pm 0,48$	

Table 2

Biserial correlations between enzyme genotypes and quantitative traits of the fattening pigs

TRAITS AND GENOTYPES	n	rb	\pm	srb	trb
DAILY GAIN					
Acp AB : BB	61	+0,44	$\pm 0,12$		3,76 ⁺⁺⁺
Acp AB : AA	73	+0,38	$\pm 0,11$		3,44 ⁺⁺⁺
Acp AB : (AA + BB)	92	+0,41	$\pm 0,09$		4,27 ⁺⁺⁺
6-PGD AB : AA	91	+0,27	$\pm 0,10$		2,66 ⁺⁺
Akp AC : CC	85	+0,27	$\pm 0,10$		2,56 ⁺
FOOD UNITS KG GAIN					
Acp AB : BB	61	+0,45	$\pm 0,12$		3,89 ⁺⁺⁺
Acp AB : AA	73	+0,35	$\pm 0,11$		3,14 ⁺⁺⁺
Acp AB : (AA + BB)	92	+0,38	$\pm 0,10$		3,88 ⁺⁺⁺
AVERAGE FAT THICKNESS					
6-PGD BB : AA	59	+0,26	$\pm 0,14$		2,04 ⁺⁺
6-PGD BB : AB	40	+0,28	$\pm 0,14$		1,80
Akp AC : CE	20	+0,47	$\pm 0,20$		2,26 ⁺
Akp AC : CC	85	+0,19	$\pm 0,10$		1,77

Table 3

Phenotypic correlations between the level of the activity of some enzymes in the blood plasma and some slaughter traits of examined pigs

ENZYMES	n	PHENOTYPIC CORRELATIONS / rP + srP)						
		Daily gain g	Garcass kg	Fat thick. on back	Rib,s numb.	Area of m. eye	Meet in leg pork	
Akp mU / ml	94	+0.21 ⁺ ± 0,1	-0.23 ⁺ ± 0,1	-0.17 ± 0,1	-0.06 ± 0,1	-0.37 ⁺⁺⁺	+0.11 ± 0,1	
GOT mU / ml	94	-0.36 ⁺⁺ ± 0,1	-0.20 ± 0,1	+0.02 [±] 0,1	+0.19 ± 0,1	-0.15	+0.09 ± 0,1	
GPT mU / ml	94	-0.08 ± 0,1	-0.06 ⁺⁺⁺ ± 0,1	+0.14 ± 0,1	+0.10 ± 0,1	-0.02 ⁺	+0.04 ± 0,1	
CPK mU / ml	94	+0.18 ± 0,1	-0.71 ± 0,1	+0.06 ⁺⁺⁺ ± 0,1	+0.21 ⁺⁺ 0,1	0,00	0,00 ⁺⁺⁺	
PHI mM / l	h94	+0.09 ± 0,1	-0.07 ± 0,1	-0.37 ± 0,1	+0.31 ± 0,1	-0.02	-0.41 ± 0,1	
Cp mg %	94	+0.05 ± 0,1	+0.10 ± 0,1	-0.46 ⁺⁺⁺ ± 0,1	+0.53 ⁺⁺⁺ ± 0,1	+0.17	+0.48 ± 0,1	

LITERATURE

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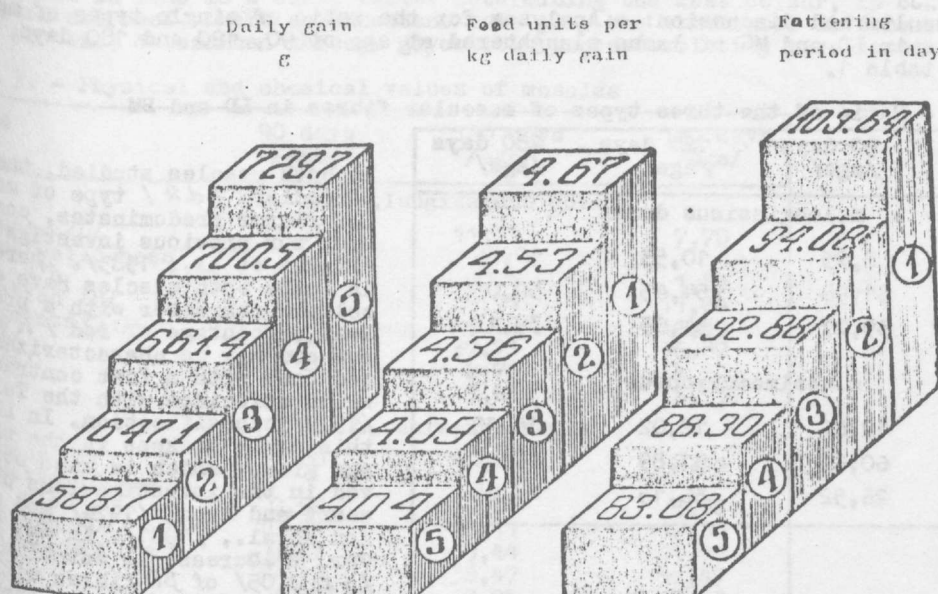


Fig.1. Graphic of daily gain, feed units per kg daily gain and longevity of fattening period in days in depends of the degree of "Sum heterozygosity" from 1 to 5 heterozygote genotypes per one pig.