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SELECTION EFFICIENCY ON BONES AND MEAT YEALD IN PIGS

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Abstract: Trial were conducted at 5 farms, on 5 breeds of pigs in itch farm, in a period from 2000 to 2010. To analyzed data, the MME LS model was used to correct FYS and Breed as fixed effect and Sire as random one. Genetic parameters were estimated from half siblings group. Bones had significantly smaller weight in Pietrain pigs compared to all other breeds. Furthermore, daily and life gains at the Pietrain breed were significantly smaller compared to other breeds. Heritability estimates were significantly different for three breeds, higher for bones, higher for meat yield. The pheneotipic and genetic variations were similar for all traits. Economic effect of selection can be analyzed and expected with a positive trend. Genetic correlation showed expected trend. It is possible to use the effect of indirect selection as well.

Key words: pig breeds, selection, bone, meat.

Introduction

Feed conversion, meat yield and litter size are most important traits in pig production. The capacity of animal is a high genetic correlation with meat yield, gain, litter size and profit.

To provide selection effect and improve the value for each trait included in aggregate genotype it is necessary to use economic value for each one at the same time with genetic parameters together with intensity of the selection and generation interval. Breed structure and selection criteria are valuable for long time run of breeding program.

The purpose of this research was to optimize and provide selection criteria and selction effects for specialized breeds using ferther for crossbreeding in commercial farms production.

Materials and Methods

The analysis has been done at 5 farms since 2000 up to 2010. We included 5 breeds, L, Y as mother line and D, H and P terminal one. The different selection criteria have been installed, same for L and Y and as a dam line and same for sire line, D, H and P *(Vidović et al., 2011)*. Average live weight at slaughter of all animals was 102 kg. The variation statistics have been used to estimate variability parameters. MME LS model has been used to analyze influences of FYS (Farm, Year and Season) then breed as fixed effect and Sire as random one. Genetic parameters, e.g. heritability and genetic correlations were estimated from half sibs group.

$$Y_{ijkl} = U + HYS_i + B_{ij} + S_{ijk} + E_{ijkl}$$

Y_{ijkl} - Number of observations hierarchically distributed;
U - General mean of observations;
HYS_i - Fixed effect of farm, year and season;
B_{ij} - Fixed effect of different breeds;
S_{ijk} - Random sire effect;
E_{ijkl} - Residual

Structure of breed and category of animals are showed in Table 1.

Table 1: Breed structure and number of selected animals

Breed	Sire	Dam	Progeny No. Carcasses
Landrace	21	814	2.326 234
Yorkshire	20	824	2.336 242
Duroc	17	238	769 222
Pietrain	12	172	522 201
Hampshire 56	8	88	68

Results and Discussion

All results are presented in Table 2-5. To predict a selection gain for bones, meat and fat it is necessary to know variability and heritability of them. Following analizys (Table 2) showed no statistical differences for bones between L,Y,D and H. Signifacntly lighter bones was found in P. At the same time P had significantly less fat than all other breeds. D and H as terminal breeds also showed significantly higher more meat in carcass then Y and L. No difference in fat content between Y,L,D and H. Variation measured by coefficient of variation were similar in all analyzed groups. Similar values were presented by *Knap et al. (1994)*, *Taylor et al. (1982)* and *Appel et al. (1982)*.

Table 2. Yeald of bons and meat in carrcas at different breeds

Breed	Traits					
	Bone		Meat		Fat	
	$\bar{x}$	V%	$\bar{x}$	V%	$\bar{x}$	V%
Landrace	7,32	8,36	43,92	7,17	23,20	13,88
Yorkshire	7,54	9,38	44,54	7,34	22,10	13,72
Duroc	7,84	9,13	46,11	8,13	23,12	13,91
Pietrain	5,34	9,82	52,10	7,90	15,16	12,00
Hampshire	7,68	7,84	46,14	7,41	21,52	14,91

Daily gain were similar in all groups, except in Pietrain was significantly lower. Same tendencies were at a life gain as well. Variations were very similar in all breeds which open possibility for selection effect (Table 3).

Heritability estimated values (Table 4) were significantly different between traits. Highest were for meat yield (0,54) and gain (0,34) and lowest for bones yield (0,23). Genetic variation has been very similar. These facts may lead breeders to optimal improvement combining a selection and crossbreeding strategy on a long period run breeding program. Genetic parameters are very similar to one estimated by *Bergzma et al. (2010)*, *Rotschild (1990)*, *Brascamp (1985)* and *Park and Kim (1996)*.

Table 3. Life and daily gain at different breeds, g and variation, %.

Breed	Traits			
	Daily gain,g		Life gain,g	
	$\bar{x}$	V%	$\bar{x}$	V%
Landrace	823	10,3	711	11,6
Yorkshire	837	9,7	719	12,11
Duroc	843	10,9	723	11,4
Pietrain	672	12,4	534	14,9
Hampshire	803	12,0	690	14,0

Table 4. The heritability estimates for yeald of bones, meat content and life gain

Traits	h²	SEh²	VA
Meat	0,57	0,19	11,8
Bons	0,23	0,14	11,6
Gain	0,34	0,18	12,3

Genetic and phenotypic correlations (Table 5) are similar value and have the same tendency. Heavier bones means at the same time more meat in carcass. So the purpose of breeders is to select on bones capacity to improve total yield of carcass, especially meat yield. Similar estimates have been provided by *Vidović et al. (2011)*.

Table 5. Genetic (above) and phenotypic (under diagonal) corelations between certain traits

Traits	Bone	Meat	Fat
Bons	-	0,56	0,37
Meat	0,46	-	-0,76
Fat	0,23	-0,79	-

Conclusion

Daily and life gain has been very similar in L,Y,D, and H, also significantly lower in P. These are consequences of lower capacity in P and lighter bones weight at same breed.

The weights of bones were significantly less in Pietrain compare to other breeds. At the same time gain were also significantly lower and more cost in production for P.

The variations for analysed traits were similar.

Genetic and phenotypic correlation were expected size and showed a possible effect of indirect selection.

The heritability estimates are large enough to provide optimal selection effect and positive trends. Optimal breed structure and selection criteria for specialized breeds can provide genetic trend improvements of a trait we analyzed.

Selekcija na veličinu kosti i prinos mesa u svinja

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Rezime

Veleičina kosti je direktno korelirana osobina sa kapacitetom individue te prinosom mesa, prirastom ili pak profitom. Kako bi utvrdili ovakvu zakonitost ili analizirali mogućnost selekcije na ovako važna svojstva postavili smo višegodišnji ogled na 5 farmi svinja koje poseduju plodne rase: landras i jorkšir te terminalne rase: durok, hempšir i pietren. Kako su istraživanja trajala više godina, na više farmi i sezona, koristili smo metod najmanjih kvadrata maksimalne verovatnoće za korekciju sistematskih uticaja na ispitivane osobine. Kao fiksi faktor analizirane su i razlike između rasa. Za ocenu genetskih i fenotipskih parametara koristili smo polusestarske skupine po ocu. Disekcija polutki izvedena je po modelu EU, 1992. Ukupno je u istraživanja bilo uključeno 77 očeva, 2.136 majki, 6.151 potomaka u tovu i 955 disekciranih grla. Nastojali smo imati 2-3 direktna srodnika u delu disekcije čime se povećala tačnost ocene dobijenih rezultata i genetskih parametara.

Može se konstatovati da P ima sitnije kosti, da sporije raste u odnosu na ostale rase, te da su ustaovljene razlike signifikantne. Uprkos ustanovljenim razlikama varijabilnost ispitivanih svojstava između rasa bila je ujednačena. Ovo ukazuje na mogućnost daljeg efikasnog pritiska selekcije na poboljšanje ovih svojstava.

Heritabilnost i genetske korelacije su u granicama očekivanih vrednosti. Najniže ocene heritabilnosti ustanovljene su kod prinosa kosti, najviše kod mesa, a

negde između kod udela masnoće u polutkama. I ovde se pokazala veoma slična varijabilnost za ispitivana svojstva. Ova činjenica daje nadu za dalji prodor i promenu srednje vrednosti primenom optimalnih kriterijuma selekcije.

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