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GENETIC TRENDS USING DIFFERENT CRITERIA OF SELECTION ON SPECIALIZED BREEDS IN PIGS

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Abstract: The trial had included 8 generations of pigs and last 10 years of has been done at 4 different breeds: Landrace and Yorkshire as dam line and Duroc and Pietrain as a sire line. Trial included 62 sires, 1794 dams, 5694 progeny and slaughtered 838 heads in total. To examine fixed and random effects LS MME model has been used. Installed different selection criteria for L, Y and D, P showed positive and expected improvement. There are know significant differences at age of slaughter between L,Y and D, P showed significantly lower gain and logger age. Genetic trends for certain traits for all used traits showed a positive line. At the same time explain significance of optimal selection criteria during production.

Key words: genetic trends, pigs, litter size, meat content, age.

Introduction

In pig production, from economic point of view, the most important traits can be as follows: number of weaned piglets per sow per year, feed conversion, growth and meat content in carcass. To provide optimal selection effect for each of them, it is important to determine a genetic correlation between them and heritability level as well. According to knowledge of negative genetic correlations between fertility or milk yield and meat content in carcass it is necessarily to develop different selection criteria or better says specialized breeds.

According to a purpose of selection effects on farm production in the analysis we separate due to selection criteria two groups of breed, e.g.: fertility and milking breeds – Landrace and Yorkshire and terminal breeds, e.g.: Duroc and Pietrain. Following literature sources we can aspect some trend which can depend from selection criteria, farm, year and season effect management on the farm too.

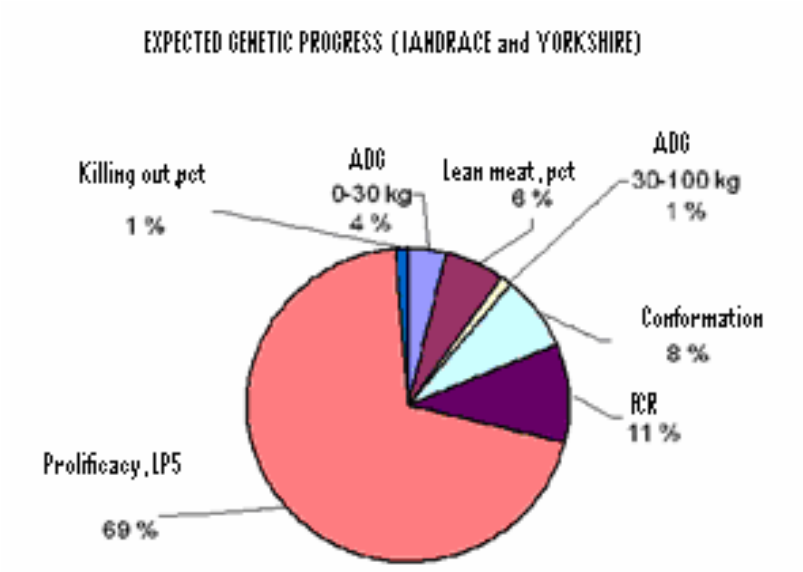
The purpose of research was to analyzed selection effects during more years of selection on farms. Selection criteria were different for terminal breeds (Duroc and Pietrain) compare Landrace and Yorkshire where selection has been concentrated on litter size.

Materials and Methods

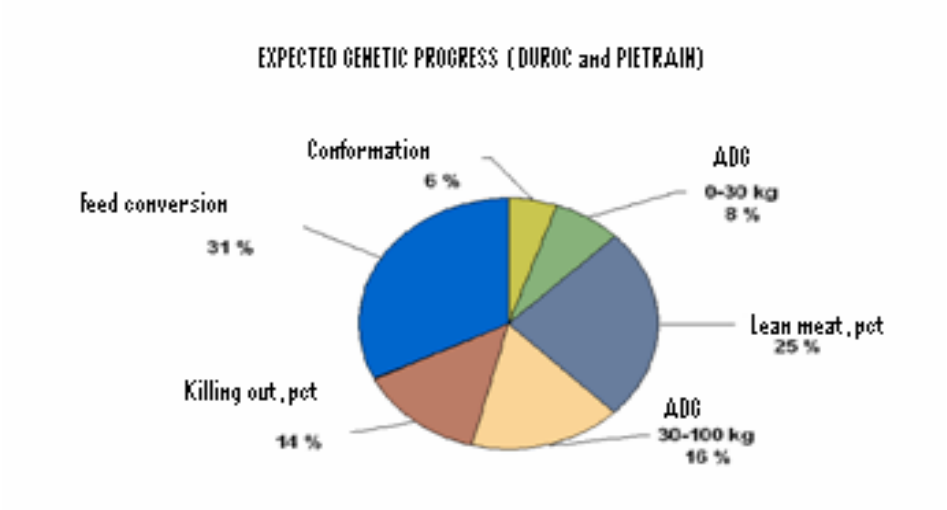
The analysis has been done at 4 farms since 2000 up to 2010. We included 4 breeds, L, Y as mother line and D and P terminal one. The following pictures give different selection criteria that were used. Average live weight at slaughter of all animals was 103 kg.

Table 1: Breed structure and number of animals in trial

Breed	Sire	Dam	Progeny No. Carcasses
Landrace	16	714	2.216 212
Yorkshire	18	704	2.164 214
Duroc	16	208	768 214
Pietrain	12	168	546 198



Graph 1: Used selection criteria for mother breeds: - Landrace and Yorkshire



Graph 2: Selection criteria used for terminal breeds: – Duroc and Pietrain

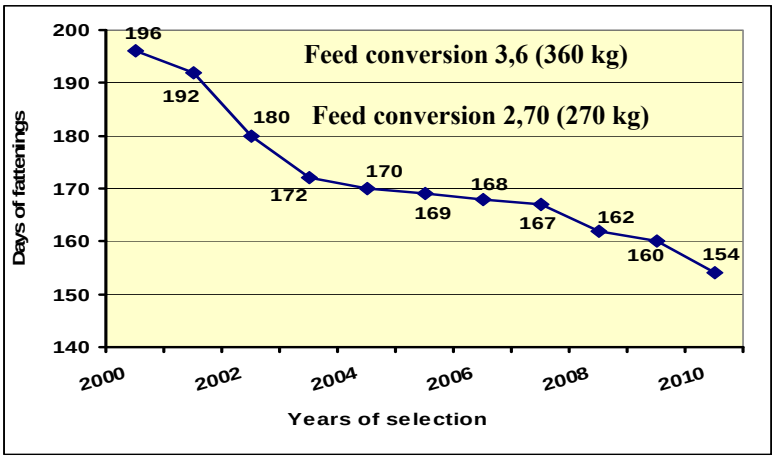
Following MME LS model has been used to analyze influences of FYS (Farm, Year and Season) then breed as fixed effect and Sire as random one.

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

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

Results and Discussion

Fattening days and feed conversion. Following graphs clearly showed expected tendency. It means we had well defined selection criteria for most economically traits. Intensity of selection has been controlled first of all by a number of dose as per jump. In case of feed conversion (FC) improvements were 90 kg per head. The most fastest improvement was at first 5 years. Since that FC is the average heritage, there are new possibilities to continue with selection effect, e.g. to decrease FC, reduce a cost and increase profit per kg of gain (graph 3). Similar trend has been shown by *Brascamp (1985)*, *Rotschild (1990)*, *Park et al. (1986)* and *Bergsma et al. (2010)*.



Graph 3: Effect of selection on age at sloughter (indirectly on growth) and feed conversion for Landrace, Yorkshire and Duroc.

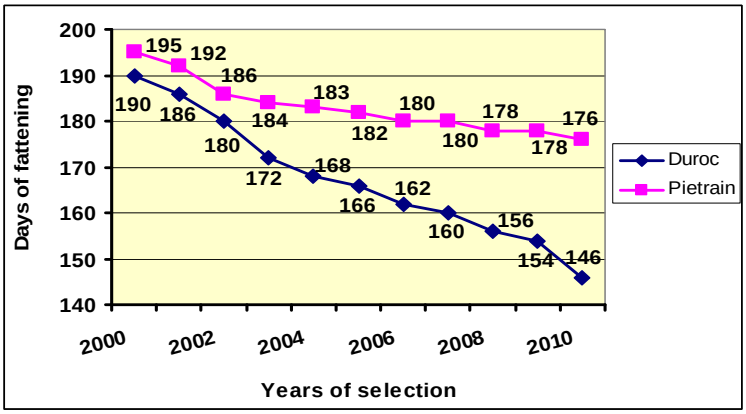
Effects:

1. Less of feed: 90 kg
2. Less fattening days : 42

Notes: There are no selection differences between Landrace, Yorkshire and Duroc. Pietrain had significantly less daily gain and age at slaughter compare to three other breeds.

According to a fattening period, we can recognize improvement of 42 days. Economically it is improvement of about 20 euros per pig.

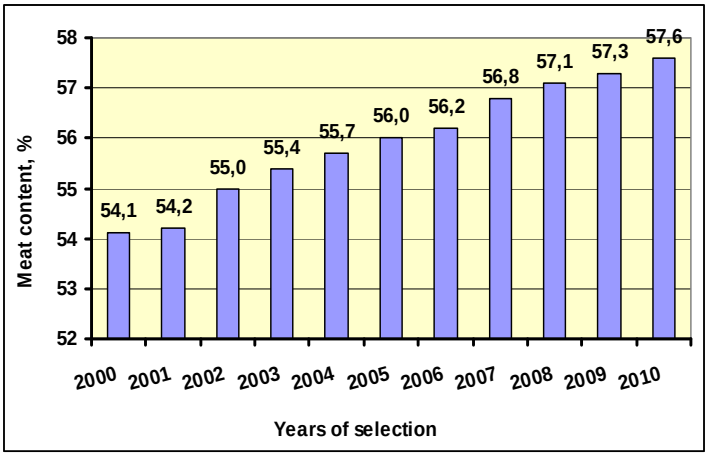
Comparison of age and FC between Duroc and Pietrain differences are present. Duroc had 32 days shorter periods to the certain commercial weight and used 88 kg less food. Feed costs in Duroc are 19 euros less.(Graph 4). These result are similar to *Vidović and Šubara (2010)*, *Vidović et al. (2011)*.



Graph 4: The differences in feed use and age at slaughter between Duroc and Pietrain in test production

The differences: Age: 32 days
Feed: 88 kg

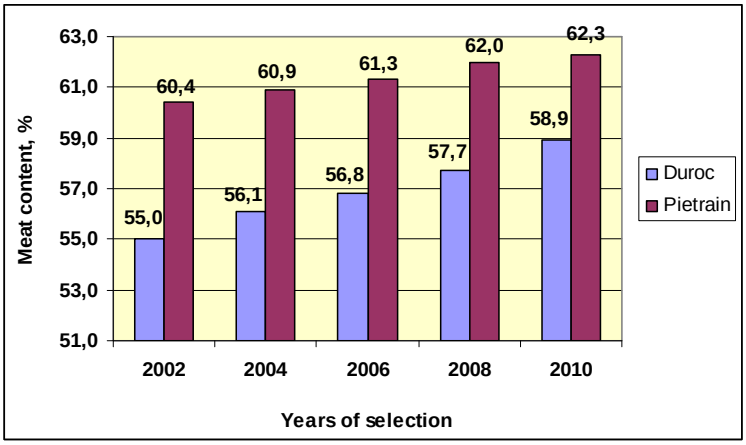
Carcass quality. Meat content in Landrace and Yorkshire has no statistical differences even they showed an optimal trend. Since those to breed are treated as a dam line to provide heterosis effect at F1 daughter's selection criteria were concentrate more on fertility traits. Expected trend were very close to realize one. It is going to back fat between 16- 20 mm at that age. Later these animals if they are going to be parents mast has some reserve to produce progeny (Graph 5).



Graph 5: The trend of selection for percentage of meat content for Landrace and Yorkshire

Just to remind case of present negative genetic correlations between milk yield and meat content in a carcass mean that breeders have to optimize selection criteria and use specialized sire and dam lines in breeding program. In our experiment, we divided into two different groups: L and Y as a mother line and used totally different selection criteria compare to terminal sire lines: D and P. After 10 years of a selection or 8 generations results were present (Graph 5 and 6).

In Graph. 6 we recognized the differences between Duroc and Pietrain even they have the same selection criteria. The only differences were at the beginning of start trial. In conclusion, we can say the trend were more or les the same as selection effect. The differences of 3,4% of meat content or raptly 2,5 kg meat between them provide about 10 euros more profit in fewer to P. But in total D made about 9 euros more profit, including FC as well. Similar conclusions were defined by *Gama et al. (1990)*, *Rotschild (2010)*, *Bergsma et al. (2010)*. Furthermore, analyzes showed both breeds had genetic improvement, faster in D then P.

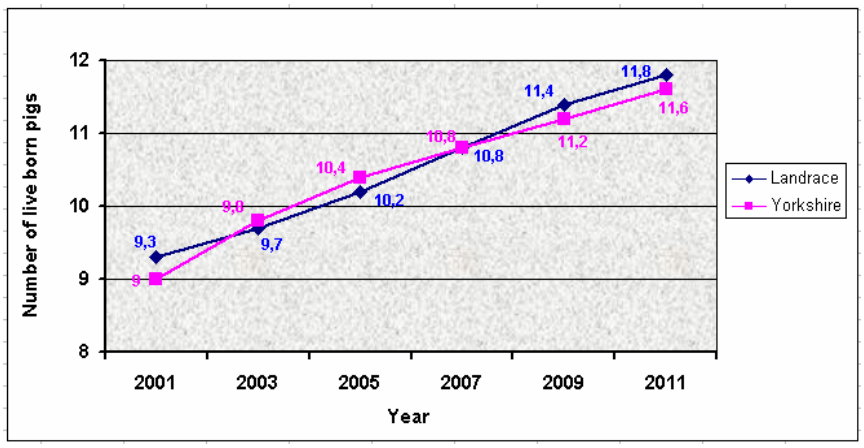


Graph 6: The effects of selection for meat content of Duroc and Pietrain

The effects in meat content, %:

- Duroc: 3,9
- Pietrain: 1,9

Litter size. First of all we used totally different selection criteria of selection in specialized breeds. Litter size was not of selection interest for D and P. So we analyzed trend for L and Y. After generations of selection, selection trend were little less than expected. Probably one of limited factors was FYS effect. Even that selection effect tendency was positive and similar for both L and Y. Similar results have been done by *Nielsen (1994)* and *Vidović at al. (2011)*.



Graph 7: The effect of selection on number of live born piglets in the first farrowing Landrace and Yorkshire.

Conclusion

Genetic trend showed expected tendency for all certain traits. It means selection criteria for certain traits have been optimal.

There have been no selection differences for gain and age at slaughtered Y, L and D. Pietrain showed significantly les gain and needed longer period to reach a certain weight. It means more cost and less profit in case of P.

Selection on meat content had the positive trend. Selection efficiencies were higher at D compare with P. Pietrain itself still have 3,4% more meat in the carcass but much longer period of fattening. Intramuscular fat was much lover at P. This has a negative effect on meat quality.

Litter size showed the positive effect. There are no significant differences between L and Y. Regime of sow feeding showed significant effect concern previous one.

Genetski trendovi korišćenjem različitih kriterijuma selekcije kod specijalizovanih rasa svinja

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Rezime

Desetogodišnja istraživanja izvedena su na 4 farme, obuhvatila su 4 rase (dve plodne – landras i jorkšir te dve terminalne – durok i peitren. Obuhvaćena su

ekonomski najvažnija svojstva: Starost pri kraju tova, indirektno prirast; Sadržaj mesa u polutkama te povećanje veličine legla na zalučenju, indirektno povećanje broja živorođenih u leglu i smanjenje broja praznih dana. Istraživanja su sprovedena na 62 oca, 1.794 majke, 5.694 potomka od kojih je disekcirano 838 grla. Za korekciju fiksnih i slučajnih uticaja na genom je primenjen mešoviti model metoda najmanjih kvadrata.

Selekcijski kriterijumi za oba tipa ispitivanih grla (plodne rase: landras i jorkšir te durok i pietren) prikazan je u radu i odnosi se na očekivanje promene tokom generacija selekcije. Dobijeni rezultati potvrdili su postavljenu hipotezu o mogućem selekcijskom trendu. Tehnologija hranjenja krmača bila je istovetna za oba genotipa plodnih i terminalnih rasa.

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