# Prediction of compatibility of different breeds of pigs in hybridization schemes by means of polylocus ISSR-PCR typing.

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## Summary

In the presented study the average heterozygosity level (AHL) of maternal and paternal populations as well as their progenies was estimated. In the group of boars AHL was: DL - 0.764, DE - 0.704 and Pi - 0.684. The AHL of sows, inseminated with semen of DL was 0.806, DE - 0.673 and Pi - 0.806. The progenies of the 1st, 2nd and 3rd groups had the AHL - 0.650, 0.754 and 0.783 respectively. Based on results of genetic analysis the heterosis effect was expected to be obtained in the group 2 and 3.

The backfat thickness measurement (BF) of pigs confirmed the expected productivity: the hybrids from 1st group had the highest level 30.09±0.97mm. The results of progenies from 2nd and 3rd crosses were 26.38±0.70mm and 25.39±0.46mm respectively.

Thus, the method of polylocus ISSR-PCR typing could be used for heterosis prediction in pig breeding.

## Introduction

One of the actual problems of commercial pig breeding is the evaluation of effectiveness of crossing of different genotypes with the aim to obtain the progenies which show the heterosis effect regarding performance traits.

Classical selection methods not allow to make the prediction of results with high accuracy, because the results are affected with different non genetic factors. The real need for improvement of new methods of prediction effectiveness of crossing exists.

At present, equally with methods PLRF and STR the methods RAPD,AFLP and ISSR are used.

In animal breeding, because of its complexity - high polymorphism level of microsatellites and recombination of non-coding sites of genes, ISSR are in use only restricted. We have developed some ISSR-PCR marker systems, which were used for genetic structure analysis of pigs population and for identification of phylogeny of breeds.

## Methods

Research work was conducted under condition of commercial farm STOV “Orzhytska”. The sows of large white breed of Ukrainian selection (ULW) were inseminated with the sperm of 3

German origin: large white (LWGO), landrasse (L) and pietrain (Pi). The research groups were built according scheme (Table 1)

**Table. 1. Scheme of the research work**

| Group number | Genotype | |
|---|---|---|
| | ♀ | ♂ |
| 1 | ULW | LWGO |
| 2 | ULW | L |
| 3 | ULW | Pi |

At the age of 2 months the blood samples were taken from the ear vein. Haplotyping was made by means of amplification of DNA fragments in PCR using 4 microsatellite primers S1 - (AGC)6C, S2 - (AGC)6G, S5 - (ATG)6C, UBC 873 - (GACA)4.

Once the animals have reached live weight 100 kg, the backfat thickness at the level of 6-7 thoracic vertebra was measured and average daily gain during lifetime was calculated.

The date obtained was statistically calculated using PC software GELSTAT, TREES and STATISTICA.

**Results**

The calculation of the heterozygosity of boars shown that the highest level of heterozygosity was detected in the breed landrace (0,7639), the lowest - in pietrain (0,6841). The boars of breed large white had the intermediate level (0,7042). The sows selected to each group had relative low level of heterozygosity (0,6731 and 0,7088 in the group 1 and 2 correspondently). The sows from the group 3 had the highest level - 0,8057.

Progenies from the 1st group had higher heterozygosity level than those in parent breeds (0,7540). In the descendant from the 2nd group the decline of heterozygosity level (0,6500) in comparison with the parent breeds was registered ($p \leq 0,1$). The hybrids from the group 3 had the heterozygosity level higher than the paternal breed (0,7830 $p \leq 0,1$).

Thus, the analysis of results of genetic characteristic of progenies from different research groups allowed to prognosticate the possible heterosis effect in descendants from the group 1 and 3 (Table 2).

**Table 2 Results of calculation of heterozygosity level using ISSR-PCR typing**

| Population | Expected heterozygosity |
|---|---|
| ULW (I group) | 0,6731 |
| LWGO | 0,7042 |
| ULW x LWGO | 0,7540 |
| ULW (II group) | 0,7088 |
| Landrace | 0,7639 |
| ULW x Landrace | 0,6500 |
| ULW (III group) | 0,8057 |
| Pietrain | 0,6841 |
| ULW x Pietrain | 0,7830 |

The evaluation of performance traits of hybrid pigs has shown that the progenies from the group 3 (ULW x Pietrain) and 1 (ULW x LWGO) had the backfat thickness on the level 25,39mm and 26,38mm correspondently. The same trait by descendants from the group 2 was 30,09mm.

The results obtained have confirmed heterosis effect in the group 1 and 3 concerning trait “backfat thickness”, what was predicted in early lifetime of piglets.

## Conclusion

The results of this research confirm the necessity of application of genetic methods for selection of maternal and paternal breeds.

ISSR-PCR method is suitable for the prediction of heterosis effect (involving 4 microsatellite primers S1 - (AGC)6C, S2 - (AGC)6G, S5 - (ATG)6C, UBC 873 - (GACA)4.

For the final conclusion the additional study is needed.