

Analyze of Selection Difference, Selection Ratio and Selection Intensity in a Swine Pattern Line

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Abstract

The researches were effectuated in a selection farm, in a swine pattern line utilized as a generator of commercial hybrid father obtained in this unit. The national program of swine improvement takes in account that genetic evaluation of selection candidates it's made based on BLUP methodology and selection effect estimation it's made by difference between average breeding values of candidates by successive generations. In analyzed population, the genetic evaluation it's made based on individual performance. Analyzing selection difference and selection ratio we can draw interesting conclusions related with breeding work efficiency.

Keywords: efficiency, selection difference, selection ratio.

1. Introduction

Selection difference is one of the major factors which influence artificial selection effect. It is defined like difference between average performances of selection individuals and average performances of candidates within same generation. It is noted with S and represents the superiority of parents chosen to reproduction. This superiority must transmitted to offspring in order to modify the average of population (only if it has a genetically fundament).

S can't be known only after selection was made, because just only after the individuals were selected it can be establish the average performance of them. So, the knowledge of selection effect in this case is tardy and from this reason we are interested to predict this effect before selection was made.

To resolve this problem, S must be standardize, namely divide by one phenotypic standard deviation estimated within candidates group. The

new measure of selection difference represents *the selection intensity* noted by i [1].

The selection intensity is influenced only by population weight (selection individuals weight or selection ratio) included in selection group. If the performances have a normal distribution, the selection intensity can be estimated from tables related to Gauss distribution.

2. Materials and methods

If selection individual's weight is noted with p beyond normal curve section and z is ordinate high in this point, according to normal curve mathematical proprieties it can be showing that [2, 3]:

$$i = \frac{S}{\sigma_P} = \frac{\bar{P}_{SP} - \bar{P}_{CP}}{\sigma_P} = \frac{z}{p}$$

where:

$$z = \frac{1}{\sqrt{2\pi}} \cdot e^{-\frac{z^2}{2}} \quad \text{and} \quad p = \frac{1}{\sqrt{2\pi}} \cdot \int_{-\infty}^z e^{-\frac{s^2}{2}} \cdot dS$$

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According to selection ratio (p) it can be known how many standard deviations the average performance of candidates will exceed the average of selection individuals. This fact represents the selection intensity (i).

The selection ratio can be known before selection activity thus and so S will depends by individual's number, not by its value. So, the selection effect can be estimate before selection activity, starting to chosen selection ratio.

The researches were made in a selection farm, for a swine pattern line. The analyze moment was 1. 04. 2004 and the research material is represent by

testing series from 2003. The analyzed traits were live weight at 181 days, average daily gain and back fat depth.

3. Results and discussion

The average performances of candidates and selection individuals are show in Table 1.

According to average performances of selection individuals it was calculated the selection difference, separately by sex, and selection ratio inferred from ratio between number of selection individuals and candidates (Table 2).

Table 1. The average performances of candidates and selection individuals for traits that is included in selection objective

Specification	Live weight at 181 days		Average daily gain		Back fat depth	
	♂	♀	♂	♀	♂	♀
Average performances of candidates M = 630 F = 1193	105 ± 0.24	98 ± 0.24	577.21 ± 1.12	538.17 ± 1.05	11.25 ± 0.075	14.16 ± 0.077
Average performances of selection individuals M = 23 F = 252	108.22 ± 1.52	101.54 ± 0.48	601.13 ± 8.03	552.13 ± 2.93	8.47 ± 0.60	11.70 ± 0.15

Table 2. Selection difference and selection ratio

Specification	Live weight at 181 days		Average daily gain		Back fat depth	
	♂	♀	♂	♀	♂	♀
S	3.22	3.54	23.92	13.96	-2.78	-2.46
p_♂	0.037					
p_♀	0.211					
i	0.530	0.420	0.704	0.297	-1.479	- 0.921
Theoretical p	0.677	0.752	0.562	0.835	0.173	0.425

The high values of selection difference show a good variability within population which is necessary for selection area create.

It was deduced the selection intensity for analyzed traits, by divided selection difference at standard deviation. According to selection intensity it was determinate theoretical p (from tables). We can observe from Table 2 that the theoretical p for all traits is bigger than those deduced from ratio between number of selection individuals and candidates. In this case, the males were chose from first 67.7% hierarchy for live weight, from

first 56.2% hierarchy for average daily gain and from first 17.3% hierarchy for back fat depth. It is a similar situation to sows: 75.2%, 83.5% and 42.5% respectively. We note that this immensely disparity can be brought by eliminations from different reasons of some candidates with a superior hierarchical position concerning to analyzed traits, possible to conformation – constitution criteria.

This situation is against all economical and animal breeding efficiency principles. These eliminations must be made before testing in order to avoid

supplementary expenses with individuals that will be eliminated but not from analyzed traits inferiority reasons. This problem has serious consequences for genetic gain, because the selection intensity decreases. We note that, in analyzed farm, the selection intensity is anyhow small because the testing space is inefficient used.

4. Conclusions

The high values of selection difference show a good variability within population. In analyzed population it is an immensely disparity between realized and theoretical selection ratio.

These disparity can be brought by eliminations from different reasons of some candidates, possible to conformation – constitution criteria. This problem has serious consequences for genetic gain, because the selection intensity decreases.

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