SELECTION ACCURACY OPTIMIZATION IN A SWINE PATTERN LINE

POPA RĂZVAN ALEXANDRU, POPA DANA, NICOLAE CARMEN, MAFTEI MARIUS, DINIȚĂ GEORGETA

Universitatea de Ştiinţe Agronomice şi Medicină Veterinară Bucureşti, Facultatea de Zootehnie, B-dul Mărăşti, nr. 59, sector 1, poparasvan@yahoo.co.uk

Abstract

The selection objective is to obtain maximum of genetic gain, with minimum effort, spend and time. So, the selection objective must be optimized by establish a more possible objectives which can start a competition. It will be maintain this who maximize the annual genetic gain per spend and time units.

Key words: animal breeding, selection accuracy, optimization

INTRODUCTION

The factors which are an influence on selection accuracy may be (Drăgănescu C. I., 1999; Popescu-Vifor, 1972, 1978, 1990):

- heritability, which depend on analyzed population and environmental conditions which are de base of performance product;
- number of performances per individual;
- quantity and quality of relationship data;
- biometric model (data repartition in classes, hypothesis and model restriction);
- breeding value prediction method.

The increase of selection accuracy has an antagonist effect: increase the genetic gain per generation, with positive economic effect, but on the other hand it is necessary more time and spends for obtain and set up the information, a big generation interval and a small genetic gain. The optimization of selection accuracy can be done by modification of enumerated factors (Drăgănescu, 1979; Popa, 2005, 2009).

MATERIAL AND METHOD

The studied material is represented by a swine pattern line sample named LS 345 Peris (63 boar families, 990 individuals). The analyzed traits are: life weight (LW), back fat depth (BFD), % of meat (%M), average daily gain (ADG), and average daily gain in carcass (ADGc).

The research method was linear multiple regression for estimate the economic importance of the traits (the global indicator is represented by average daily gain in meat maximization) and simulation for selection

accuracy optimization (Grosu, 1995, 2003; Grosu et al., 1997,). In all simulation variants it was maintain % of meat because this trait is the main direction for swine pattern line genetic improvement.

RESULTS AND DISCUSSIONS

The results about relative economical importance (v) for two traits selection index variants are presented in table no 1.

Table 1

The relative economical importance for two traits selection index variants

Selection index	v_1	v_2
%M + LW	0.1342	0.8658
%M + BFD	0.8567	0.1433
%M + ADG	0.1037	0.8963
%M + ADG_c	0.2125	0.7875

The results obtain by simulation of two traits selection index are presented in table no 2.

Table 2

2 traits selection index variants

Selection index	b_1	b_2	Accuracy	ΔG_i	
%M + LW	-0.0972	0.5761	0.6705	-0.4022%	0.5761 kg
%M + BFD	0.4913	0.0343	0.6304	3.2183%	-2.8611 mm
%M + ADG	0.0658	0.5262	0.6330	3.1928 %	0.0086 g
%M + ADG_c	0.1350	0.7585	0.6375	3.2085%	0.0073 g

Analyzing data presented in table no 2 it can be observed that the worst index variant is that which combine percent of meat and life weight, although it have the best selection accuracy (0.6705). The negative genetic gain for percent of meat makes this variant inefficiently.
The variant that get the high genetic gain is that which combine percent of meat and back fat depth.
The results about relative economical importance (v) for three traits selection index variants are presented in table no 3.

Table 3

The relative economical importance for three traits selection index variants

Selection index	v_1	v_2	v_3
%M+LW+BFD	-0.1128	1.3282	-0.2154
%M+LW+ADG	0.1130	-0.0891	0.9760
%M+LW+ADGc	0.3231	-0.4856	1.1625
%M+BFD+ADG	-0.0739	-0.1908	1.2647
%M+BFD+ADGc	0.1165	-0.1671	1.0506
%M+ADG+ADGc	0.4108	-1.2835	1.8726

The results obtain by simulation of three traits selection index are presented in table no 4.

Analyzing data presented in table no 4 it can be observed that the worst index variant is that which combine percent of meat, life weight and back fat depth. The variant that get the high genetic gain is that which combine percent of meat, back fat depth and average daily gain in carcass, although it have not the best genetic evaluation accuracy (0.6396).

The results about relative economical importance (v) for four traits selection index variants are presented in table no 5.

Table 5

The relative economical importance for four traits selection index variants

Selection index	v_1	v_2	v_3	v_4
%M+LW+BFD+ADG	-0.1342	0.3562	-0.2153	0.9934
%M+LW+BFD+ADGc	0.1053	0.0409	-0.1703	1.0241
%M+LW+ADG+ADGc	0.5583	-0.5488	-1.4289	2.4193
%M+BFD+ADG+ADGc	0.1680	-0.1590	-0.3028	1.2938

The results obtain by simulation of four traits selection index are presented in table no 6.

Analyzing data presented in table no 6 it can be observed that the worst index variant is that which combine percent of meat, life weight, back fat depth and average daily gain in carcass. The variant that get the high genetic gain is that which combine percent of meat, life weight, back fat depth and average daily gain, with the best genetic evaluation accuracy (0.9744).

The results about relative economical importance (v) for all five traits selection index variant are presented in table no 7.

Table 7

The relative economical importance for five traits selection index variants

Selection index	v_1	v_2	v_3	v_4	v_5
%M+LW+BFD+ADG+ADGc	0.1631	0.0001	-0.1596	-0.2716	1.2680

The results obtain by simulation of the unique five traits index variant are presented in table no 8.

Table 8

5 traits selection index variant

Trait	b	Accuracy	ΔG_i
%M	0.5115	0.7632	2.8232%
LW	-0.1343		-4.9936 kg
BFD	0.3520		-3.4324 mm
ADG	39.0701		-0.0165 g
ADGc	-32.2243		-0.1610 g

Although the genetic gain for percent of meat is good enough, the negative values for others traits, demonstrate the ineficiency of this index variant (except back fat depth where the negative values are expected).

Table 4

3 traits selection index variants

Selection index	**b_1**	**b_2**	**b_3**	**Accuracy**	**ΔG_i**		
%M+LW+BFD	-0.8343	0.9822	-0.6764	0.6805	-0.5117%	10.2873 kg	2.1563 mm
%M+LW+ADG	0.0907	-0.0586	-0.0020	0.7144	1.5670%	-9.3678 kg	-0.0458 g
%M+LW+ADGc	0.3099	-0.2476	-17.4364	0.7036	1.0104%	-10.0148 kg	-0.0473 g
%M+BFD+ADG	0.0408	-0.0278	-2.2338	0.6352	2.5108%	-3.3775 mm	-0.0320 g
%M+BFD+ADGc	0.1474	-0.0282	-2.2634	0.6396	3.0820%	-3.3389 mm	0.0121 g
%M+ADG+ADGc	0.2554	64.2356	-70.1913	0.7304	2.3992%	-0.0020 g	-0.0069 g

Table 6

4 traits selection index variants

Selection index	**b_1**	**b_2**	**b_3**	**b_4**	**Accuracy**	**ΔG_i**			
%M+LW+BFD+ADG	0.5907	-0.2294	0.4840	20.6119	0.9744	2.7761%	-0.7074 kg	-2.3415 mm	0.0056 g
%M+LW+BFD+ADGc	-0.1726	-0.0466	-0.1726	63.4644	0.8369	0.1951%	9.0645 kg	-0.2687 mm	0.0499 g
%M+LW+ADG+ADGc	0.4760	-0.3763	-38.7832	41.6539	0.7104	1.4100%	-9.5477 kg	-0.0476 g	-0.0438 g
%M+BFD+ADG+ADGc	0.1865	-0.0149	9.8357	-13.3854	0.6347	3.0445%	-3.3792 mm	-0.0122 g	-0.0119 g

CONCLUSSIONS

The selection index variant that get the high genetic gain is that which combine percent of meat, life weight, back fat depth and average daily gain, as well as genetic evaluation accuracy (0.9744) and genetic gain (2.7761 %, 0.0704 kg, -2.3415 mm and 0.0056 g respectively). So, it is recommended to introduce of this traits in analyzed population selection objective, with guaranty of best direction genetic improvement for a swine pattern line.

REFERENCES

1. Drăgănescu C., 1979, Ameliorarea animalelor, Editura Ceres, Bucureşti;
2. Drăgănescu C. I., 1999, Optimizarea programelor de selecție, Note de curs masterat, USAMV Bucureşti;
3. Grosu H., 1995, Studii privind perfecționarea metodicii de ameliorare la suine cu ajutorul metodelor moderne. Teză de doctorat, USMV Bucureşti;
4. Grosu H., 2003, Programe de ameliorare, Editura AgroTehnica, Bucureşti;
5. Grosu H., S. Lungu, V. Kremer, 1997, Modele liniare utilizate în ameliorarea genetică a animalelor, Editura Coral Sanivet, Bucureşti;
6. Popa R., 2005, Cercetări privind optimizarea unui program de ameliorare la o linie paternă de porci în condiții de însămânțări artificiale, Teză de doctorat, USAMV Bucureşti;
7. Popa R., 2009, Programe de ameliorare, Ed. Printech, Bucureşti;
8. Popescu-Vifor Șt., 1972, Studiul parametrilor genetici ai performanțelor de reproducție la scroafe în vederea alcătuirii unor indici de selecție. Teză de doctorat, IANB Bucureşti;
9. Popescu-Vifor Șt., 1978, Genetica animală, Editura Ceres, Bucureşti;
10. Popescu-Vifor Șt., 1990, Genetica populațiilor de animale domestice, EDP, Bucureşti;