Original paper

THE ASSESSMENT OF BREEDING VALUE OF FIRST FARROWED SOWS BY THE METHOD OF SELECTION INDICES

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Abstract

The goal of this research paper was to assess the breeding value of first farrowed Swedish Landrace sows by the means of selection indices method. The traits on the basis of which the breeding value of animals was assessed are following: daily liveweight gain, average thickness of collected back fat measured at five sites and number of liveborn piglets in the first litter. The liveweight gain and carcass quality traits determined at the end of performance test were corrected for the body mass of 100kg by the method of basic indexes and following mean values were determined: for corrected daily liveweight gain (KZDP) 499.92g/day and for corrected average collected backfat thickness (KSL) 20.01mm. The first farrowed sows on average produced 8.09 liveborn piglets in the litter. Studying the effect of the gilts` birth year and season on KZDP and KSL it was determined that the gilts` birth year and season had no statistically significant influence (P>0.05) on KZDP variation but they had a statistically significant effect on KSL (P<0.01). The year and the season of farrowing and the class of backfat thickness in performance test did not display any statistically significant effect (P>0.05) on BZPL, while the KZDP class and the age at first farrowing had a statistically significant effect on the variability of these trait (P<0.05; P<0.01). All studied traits varied statistically significantly (P<0.01) under the impact of the gilts` sire or dam. Heritability coefficients were: h^2= 0.402 for KZDP, h^2= 0.261 for KSL and h^2= 0.177 for BZPL. The relation between KZDP and KSL was of a medium strength both at phenotype and genetic levels (r_{ph}=0.491; r_g=0.411), while the relation of these traits with BZPL did not exist, except for the genetic relationship between KSL and KZDP which was of a medium strength (r_g=0.252). Three equations for the selection indexes were constructed among which as the most optimal was chosen the one which includes all three traits (KZDP, KSL and BZPL) and whose correlation coefficent of selection index and aggregate genotype was r_{IAG} = 0.5473.

Key words: *backfat thickness, daily liveweight gain, heritability, piglets, selection index*

Introduction

The assessment of animal breeding value represents a very delicate procedure which should consider a number of traits of which some have better and some have poorer values and on the basis thereon to make a conclusion and choose or remove the animal from further breeding (Popovac et al., 2014). One of those procedures is the method of selection indexes. The method of selection indexes has found its special application in pig breeding in the countries where the pig breeding is not at the very high level and where the conditions for the use of BLAP AM-method on which the assessment of swine breeding value is based in the countries with developed livestock productions have not been created yet. A practical application of this method is relatively simple because when the equation for the assessment of breeding value is constructed it means the simple exchange of determined phenotype values of the traits of animals whose breeding value is being assessed and as the result we obtain the assessed animal breeding value expressed in index points (Radojković et al., 2010). The major characteristic of this metodological procedure is that it can compensate for the values of traits and produce, as a final result of the assessment of breeding value, the number of index points on whose basis we rank the animals whose breeding value is being assessed. This methodological procedure is particularly good in the conditions in which the traits have a high heritability and where the impact of environment factors is low (Sellier et al., 2000).

Taking into account the fact that liveweight gain and carcass quality traits in pigs display from medium to high heritability (Brkić et al., 2001; Imboonta et al., 2007; Hoque and Suzuki, 2008; Saintilan et al., 2012), and the fact that reproductive traits, although they have low heritability (Damgaard et al., 2003; Luković et al., 2004; Radojković et al., 2012) influence in the same degree a comprehensive estimation of sows breeding value, the equation of selection index for the assessment of breeding value of sows has been constructed on the basis of their daily liveweight gain and average backfat thickness measured at the end of performance test and on the number of liveborn piglets in the first litter.

Material and methods

A set research goal was to construct the equation of selection indexes that served to assess the breeding value of the farm-raised Swedish Landrace sows breed on the basis of their productive results obtained in performance test and during the first farrowing. Data set on which this was performed contained the information for 1020 sows born in 5 consecutive years and farrowed in 6 consecutive years. The sows were the ascendants of forty-one sires, where the minimum number of daughters per one sire was 10 for the reason of obtaining the accuracy in calculating the genetic parameters whilst the each sire on average produced 24.88 daughters included in the analysis.

The traits included in the analysis were: corected daily liveweight gain at the end of test (**KZDP**), corrected average collected backfat thickness measured on 5 sites on the backs at the end of test (**KSL)** and number of liveborn piglets in the first litter (**BZPL**).

The correction of the liveweight gain and carcass quality traits was performed for the body mass of gilts of 100kg, by the method of basic indexes based on regression analysis.

Statistical processing of data included the establishing of descriptive statistical indicators and measures of variation, then examination of the variability of traits on phenotype and genetic level and phenotype and genetic relationship of these traits. Descriptive statistical processing of data was done by the use of programme package STATISTICA, *Version 5.0.* Variability of traits on phenotype and genetic level, heritability and interrelationship of the same traits and parameters necessary (variances and covariances) for the construction of selection indexes were calculated by the method of the least squares by means of programme packages LSMLMW – Harvey (1990) and SAS, 9.1.3.(2007).

Several mixed models were used on whose basis we studied the variability of the traits of liveweight gain and carcass quality traits and reproductive traits;

$$\textbf{Model 1: } Y_{ijk} = \mu + G_i + S_j + o_{ijk} + e_{ijk}$$

Where: Y_{ijk} – is the manifestation of the trait (KZDP, KSL), μ – population general average, G_i – fixed effect of the gilts` birth year, $S_j$ – fixed effect of the gilts` birth season, o_{ijk} – random effect of the gilt`s sire, e_{ijk} – random effect of non-determined factors.

$$\textbf{Model 2: } Y_{ijklm} = \mu + G_i + S_j + P_k + D_l + b\,(X - \bar{X}) + o_{ijklm} + e_{ijklm}$$

Where: Y_{ijklm} – is the trait manifestation (BZPL), μ – population general average, G_i – fixed effect of the sows` first farrowing year, S_j – fixed effect of the season of the first farrowing of sows, P_k – fixed effect of the class of the corrected daily liveweight gain at the end of test, D_l – fixed effect of the class of corrected collected backfat thickness at the end of test, $b\,(X - \bar{X})$ – linear regression effect of the age of sows at the first farrowing, o_{ijklm} – random effect of sows` sire, e_{ijkil} – random effect of non-determined factors.

$$\textbf{Model 3: } Y_{ijk}= \mu + G_i + S_j + o_{ijk} + e_{ijk}$$

Where: Y_{ijkl} – is the trait manifestation (KZDP, KSL, BZPL), μ – population general average, G_i – fixed effect of the year of birth of gilt-sow, S_j – fixed effect of the season of birth of gilt-sow, o_{ijk} – random effect of the sire of gilt-sow, e_{ijk} – random effect of non-determined factors.

Model 3 is constructed in such a way so as to include only those factors which displayed statistically significant effect on some of the studied traits and which could influence both groups of traits, in order to calculate the heritability and relationship of the liveweight gain trait and reproductive traits that served for the construction of selection index.

Heritability of studied traits was calculated by the method of interclass correlation of half-sibs on father´s side. Heritability equation can be expressed in a following way:

$$h^2 = (4\sigma_s^2) / (\sigma_s^2 + \sigma_e^2)$$

Where: h^2 – is a heritability coefficient (heritability), σ_s^2 – intersire variance, σ_e^2 – intra-sire (error) variance.

Correlation coefficients on phenotype and genetic levels were calculated on the basis of following equation:

$$r_{XY} = (Cov_{XY}) / \sqrt{(\sigma_X^2 + \sigma_Y^2)}$$

Where: r_{XY} – is the correlation coefficient between the X and Y traits, Cov_{XY} – covariance between X and Y traits, σ_X^2 – variance of the X trait, σ_Y^2 – phenotype variance of the Y trait.

The strength of the interrelation of traits was determined on the basis of Roemer-Orphal classification (Latinović, 1996). Statistical significance of correlation coefficents was determined on the basis of the tables of statistical significance produced by Snedekor and Cochran (1980).

Breeding value of first farrowed sows assessed by the method of selection indexes can be expressed by following equation:

$$I = b_1\,(X_1 - \bar{X}_1) + b_2\,(X_2 - \bar{X}_2) + ... + b_n\,(X_n - \bar{X}_n)$$

Where: I – is a relative animal breeding value estimated by selection index (value of selection index determined for each animal), b_i – partial coefficients of multiple regression for each trait included in selection index, ($X_i - \overline{X}_i$) – difference between the phenotype value of the individual trait and population average.

For calculating the partial regression coefficients (b) we used matrix equation from which the following equation stems out:

$$P * b = G * v$$

$$b = P^{-1} * G * v$$

Where: b – is the vector of the solutions of the partial regression coefficients for each trait (X), P^{-1} – inverse phenotype matrix formed of variances and covariances of the traits included in selection index, G – genetic matrix formed of variances and covariances of the traits included in selection index, v – vector of relative economic value of the traits included in selection index.

The accuracy of assessed breeding value by the method of selection indexes is expressed by the correlation coefficent between selection index and agreggate genotype of each individual. Higher value of this correlation coefficent increases also the accuracy of the assessment of the animal breeding value by the means of selection indexes. Agreggate genotype can be explained by following equation:

$$AG = v_1 * h^2_1 * X_1 + v_2 * h^2_2 * X_2 + ... + v_i * h^2_i * X_i$$

Where: AG – is an agreggate genotype, v_i – economic value of the trait (X_i), h^2_i – trait heritability coefficient (X_i), X_i – trait phenotype value of each individual.

Correlation coefficient of selection index and agreggate genotype is calculated by means of following equation:

$$r_{IAG} = \sigma_I / \sigma_{AG}$$

Where: r_{IAG} – is a correlation coefficient between selection index and agreggate genotype, σ_I – standard deviation of selection index, σ_{AG} – standard deviation of agreggate genotype.

For calculating the economic value of the traits included in selection index we used the methodology used by Popovac et al. (2014), where the traits economic value is presented as a ratio of cost fluctuations per trait unit when the traits have been changed for the set selection goal. The set selection goal was to improve the traits for 10% out of which we obtained following economic values of the traits:

BZPL:	1,
KZDP:	0.02334,
KZLSL:	-0.58348.

Results and discussion

Table 1 shows the average values and variability of corrected daily liveweight gain and corrected collected backfat thickness in peformance tested gilts of Swedish Landrace breed.

The average value of corrected daily liveweight gain at the end of test in examined gilts was 499.92 g/day, what is in harmony with the results obtained by Mijatović et al. (2009), taking into account that they determined a somewhat higher value of corrected daily liveweight gain of 502 g/day. Vidović et al. (2012), determined a significantly higher value of this trait in Swedish Landrace gilts which was 670 g/day. Corrected thickness of collected backfat thickness at the end of performance test in tested gilts on average was 20.01 mm, what are somewhat lower values in relation to the values (22.30 mm) determined by Radivojević, (1992) in his research.

Table 1. *Average value and variability for KZDP and KSL*

Trait	N	$\bar{X}$	SD	Min	Max	CV	μ ± se
Corrected daily liveweight gain (g) **KDP**	1020	499.92	74.50	317.0	705.0	14.90	496.19±2.68
Corrected thickness of collected backfat thickness (mm) **KSL**	1020	20.01	3.76	10.3	34.1	18.79	19.97±0.13

The years and the seasons of birth and the sires of gilts are included in the model as factors which helped to explain the existing variability of KZDP and KSL at the end of direct test. Statistical significance of these factors and F_{exp} values per studied years and seasons of birth and the gilts` sires are shown in Table 2.

Table 2. *Statistical significance and F_{exp} values for KZDP and KSL per years, seasons of birth and gilts sires*

Traits	Effects			R^2
	Birth season	Birth year	Sire	
KZDP F_{exp}	1.668^{ns}	0.133^{ns}	3.339 **	0.158
KSL F_{exp}	7.804**	7.960**	2.562 **	0.187

^{ns}-no statistical significance, **-P<0.01; R^2- model determination coefficient

The results of the variance analysis displayed in Table 2 show that the year and the season of birth of gilts did not express (P>0.05) a significant effect on KZDP, while KSL statistically significantly (P<0.01) varied under the influence of the year and the season of birth of gilts. The research also showed a statistically significant (P<0.01) effect of sire of gilts on variability of studied traits of liveweight gain and carcass quality.

The research by Gogić et al. (2012) and Radović et al. (2012) show statistically significant variation in daily liveweight gain and the backfat thickness under the effect of gilts` birth year. Significant effect of the season of gilts` birth on KZDP and KSL established Vuković (1998) in his research. On the other hand, Popovac et al. (2014) did not determine a significant variation of the liveweight gain trait and carcass quality trait under the influence of the year and season of gilts` birth, while the same authors established that the sire had statistically highly significant effect on daily liveweight gain and backfat thickness in performance tested gilts. The results of research presented in this paper are in harmony with the research of Mijatović et al. (2009) and Vidović et al. (2012), who determined a statistically significant variation of daily livewight gain under the influence of gilts` sire. Variability of backfat thickness measured on different sites and of daily liveweight gain in performance tested gilts under the influence of sire was determined also by Brkić (2002) in his research.

Average value and variability of the number of liveborns in litter (BZPL) in first farrowed sows of Swedish Landrace included in this trial are shown in Table 3.

Table 3. *Average value and variability for BZPL*

Trait	N	$\bar{X}$	SD	Min	Max	CV	μ ± se
Number of liveborn in first farrowed litter **(BZPL)**	1020	8.09	2.41	1	14	29.79	7.91±0.27

The first farrowed sows on average had 8.09 liveborns in litter, what are the values lower or in concordance with the values for this trait in comparison with the records found in literature. Radojković (2007) determined the value of this parameter of fertility in the interval from 8.08 to 9.14 liveborn piglets in litter on different farms. Average values of BZPL determined in different studies are as follows: Radojković (2000) 8.20, Brkić (2002) 9.63, Damgaard et al. (2003) 10.60 and Bečkova and Vaclavkova (2008) 10.28 liveborn piglets in the first farrowed litter.

Statistical significance of the factors and $\boldsymbol{F_{exp}}$ values for BZPL per studied years and seasons of sows farrowing, the class of daily liveweight gain and the class of backfat thickness, regression effect at first farrowing and sows` sire are shown in Table 4.

Table 4. *Statistical significance and $\boldsymbol{F_{exp}}$ values for BZPL per years and seasons of farrowing, classes of KZDP and KSL, age at first farrowing and sows sires*

Traits	Effects						R^2
	Year of farrowing	Season of farrowing	Class KZDP	Class KSL	Age at first farrowing	Sire	
BZPL $\boldsymbol{F_{exp}}$	2.096^{NZ}	0.178^{NZ}	2.717*	0.788^{NZ}	41.346**	1.991**	0.143

^{ns}- P>0.05; **-P<0.01; *-P<0.05; R^2- model determination coefficient.

The results displayed in Table 4 show that the year and season of the sows` first farrowing did not exhibit (P>0.05) statistically significant effect on BZPL.

F values shown in Table 4 suggest that the class KZDP affects statistically significantly (P<0.05) BZPL, but they show no statistically significant (P>0.05) effect of KSL class on the same trait. The classes are formed (6 classes) in such a way that the values that have one standard deviation more or less in relation to the average make one class. Excluding the classes 1 and 6 for KZDP due to a relatively small number of animals which are within these classes there was a trend of increasing the number of liveborn piglets with the increase of the KZDP class.

Besides mentioned fixed effects on BZPL the regression effect of age at first farrowing of sows on this trait was also examined and it was established that BZPL statistically significantly (P<0.01) varies depending on the age of sow in the moment of first farrowing. Average age of the first farrowed sows at farrowing was 343.68 days, where with the increase of the age at first farrowing for 1 day the litter increased by 0.02 liveborn piglets as well.

Analyzing the effect of sows` sires on BZPL during its first farrowing it was found out that the sire exhibits statistically significant (P<0.01) effect on BZPL.

Studying the phenotype variability of traits of fertility of sows of Swedish Landrace breed Radojković et al. (2007) reports that the year and season of farrowing display no statistically significant effect on BZPL and other traits of the size of litter at first farrowing where the results of these studies are in harmony with the results of previously mentioned authors. Significant effect of the year and season of farrowing on BZPL determined Petrović et al. (1998) and Sobczynska et al. (2007) in their research.

The results of this research are consistent with the research of Čehov and Tvrdon (2008) and Mijatović et al. (2009) who established statistically significant variation of BZPL depending on the class of daily liveweight gain obtained by tested Swedish Landrace gilts, the authors also state that the sows with highest daily liveweight gain also had the greatest number of liveborn piglets in litter.

The results obtained in this paper confirm the results of Radojković (2007) that age at first farrowing exhibits statistically significant effect on first farrowed BZPL.

Analysing the effect of sires of first farrowed sows on BZPL in their first litter in the available literature we found some results which also indicate to the significant effect of the sire on this trait (Brkić, 2002; Sobczynska et al., 2007; Radojković et al., 2007), what was shown also in this research.

Table 5 shows the heritability values (h^2) for KZDP, KSL and BZPL traits obtained by the use of different mixed models on whose basis we have studied variability, heritability and relationship between these traits.

Table 5. *Values of heritability coefficients and heritability error*

Trait	Model 1		Model 2		Model 3	
	h^2	SE h^2	h^2	SE h^2	h^2	SE h^2
KZDP	0.377	0.106	-	-	0.402	0.110
KSL	0.260	0.087	-	-	0.261	0.087
BZPL	-	-	0.172	0.072	0.177	0.072

h^2-heritability coefficient; **SE h^2**-heritability error

In Table 5 we can see that the heritability values obtained by the use of different models of the same traits are equalised. Heritability coefficients (h^2=0.377; 0.402) for KZDP show mean heritability of this trait and give possibility of successful selection-improving work when the improvement of this trait is in question. Heritability value of h^2=0.260; 0.261 for KSL depending on the model applied, indicate also to the mean heritability of this trait. Contrary to the traits of liveweight gain and carcass quality the reproductive traits have low heritability what is shown also by heritability coefficients obtained for BZPL of h^2=0.172; 0.177.

The results of this research are very similar to the results of Vuković et al. (2007) and Szynder-Nedza et al. (2010), who determined the heritability of gilts` daily liveweight gain of h^2=0.270 or h^2=0.390 allocating this trait into the group of mean heritability value. Low heritability of h^2=0.140 for KZDP in gilts at the end of test in their research using the REML method was established by Malovrh and Kovač (1999) defining this trait as a low heritability trait.

Backfat thickness has a medium heritability what is shown by the research of Vuković et al. (2007) and Urankarova et al. (2012), where the authors state that phenotype manifestation of this trait depends 38% or 28% upon genetic factors. High heritability of backfat thickness of h^2=0.610 at the end of test was determined in the research by Imboonta et al. (2007). All showed values of heritability obtained in this research for KSL are lower in relation to the values found in literature.

Heritability values for BZPL determined in this research are higher in relation to the heritability obtained by the means of different methods in the studies by: Damgaard et al. (2003) h^2=0.120, Luković et al. (2004) h^2=0.102 and Radojković et al. (2012) h^2=0.064.

In Table 6 the values of the coefficients of phenotype correlations are shown above the diagonal line while the values of coefficients of genetic correlations are shown under the diagonal line.

Table 6. *Coefficients of phenotype and genetic correlations between KZDP, KSL and BZPL*

Trait	KZDP	KSL	BZPL
KZDP	-	0.491**	0.087**
KSL	0.411**	-	0.039^{ns}
BZPL	0.092**	0.252**	-

1)Correlation coefficient for 5 and 1% safety (d.f.=1000) is 0. 062 and 0.081.

Relationship between KZDP and KSL is statistically significant and of medium strength nearing close to a strong traits relationship. Coefficient of phenotype correlation of r_{ph}=0.491 shows that in the individuals that have higher daily liveweight gains the share of adipose tissue in total gain increases as well. On the other hand, positive value of genetic correlation coefficient of r_g=0.411 warns us that one-sided selection for high daily liveweight gains could lead to the aggravation of the quality of carcass in the pig populations in which this kind of selection is being applied.

Relationship between KZDP and BZPL is statistically significant, but there is correlation neither at phenotype nor at genetic level (r_{ph}= 0.087; r_g=0.092).

Correlation coefficient (r_{ph}=0.039) between KSL and BZPL at the phenotype level is statistically insignificant and shows that there is no relationship of these traits. Genetic relation (r_g=0.252) is statistically significant and of medium strength.

Hicks et al. (1998) in their research on the relationship between the daily liveweight gain and backfat thickness at the end of test determined a negative very low or almost no relationship both at phenotype and genetic level (r_{ph}=-0.14; r_g=-0.08), taking into account that in their calculations they included the results of measuring the boars that finished the performance test. Results obtained by Nguyen and McPhee (2005) for the relationship between daily liveweight gain and backfat thickness show a moderate negative coefficient of genetic correlation of r_g=-0.250 indicating that in the individuals selected for higher daily gains and meatiness the backfat thickness decreased at the same time. Relationship between the traits displayed in this paper is both at the phenotype and genetic level significantly stronger with a positive pre-sign what is not in harmony with the results obtained by previous two groups of authors. The value obtained for genetic correlation coefficient is very close to the value of genetic correlation coefficient (r_g=-0.437) determined by Brkić et al. (2001) where they determined negative pre-sign of this coefficient indicating the possibility of improving one trait so that in indirect way the value of other trait improves as well.

Obtained results are in harmony with the results obtained by Vuković (2003), who also did not establish any phenotype correlation between KZDP and KSL on one hand and BZPL on the other, taking into account that he determined lower value of correlation coefficient of negative pre-sign of r_{ph}=-0.006 between KZDP and BZPL. Absence of relationship on genetic level between backfat thickness at the end of test and the number of liveborn piglets in the first litter was determined by Holm et al. (2004) showing coefficient of genetic correlation of r_g=-0.000, but the results shown in this paper are not in harmony with the results of the above mentioned group of authors.

On the basis of parameters determined by the analyses the several mixed selection models were constructed where on the basis of the value of correlation coefficient of selection index and agreggate genotype on one hand and selection strategy on the other we chose the best equation of selection index for the assessment of breeding value of sows after the first farrowing. Table 7 shows the equations of selection indexes and correlation coefficent of index and agreggate genotype (r_{IAG}).

Table 7. *Equations of selection indexes and correlation coefficient of index for assessment of breeding value of first farrowed sows and agreggate genotype (r_{IAG})*

Selection index	r_{IAG}
$SI_1 = 0.2072^a (x_1 – 8.09) + 0.0099^b (x_2 – 499.92) – 0.1471^c (x_3 – 20.01)$	0.5473
$SI_2 = 0.1684^a (x_1 – 8.09) + 0.0097^b (x_2 – 499.92)$	0.5492
$SI_3 = 0.2140^a (x_1 – 809) – 0.1824^c (x_3 – 20.01)$	0.5158

[a] – values of partial regression coefficients for BZPL; [b] – values of partial regression coefficients for KZDP; [c] – values of partial regression coefficients for KSL; x_i – phenotype values of traits of each individual.

The accuracy of constructed mixed selection indexes measured by correlation coefficents r_{IAG} ranged from r_{IAG} = 0.5158 in index 3 to r_{IAG} = 0.5492 in index 2. Approximate values of correlation coefficients of different indexes give possibility to choose selection index which includes a greater number of traits to which we gave a similar importance in this research while at the same time the assessed breeding value of individuals do not loose the accuracy. In line with this as the most optimal selection index for assessing the breeding value of first farrowed sows we chose SI_1 which includes three traits and they are BZPL, KZDP and KSL.

Obtained values for the correlation coefficients for index and agreggate genotype are lower in relation to the values determined by Brkić (2002), who obtained the indicators of accuracy of mixed selection indexes in the interval of r_{IAG} = 0.572 to r_{IAG} = 0.640. The author included a number of traits of gain and reproductive traits and obtained as the most accurate index for the assessment of sows breeding value the one that included following traits: age at the end of test, daily liveweight gain, meatiness, number of total born piglets, the litter mass at 28th day and index of piglets mass at 28th day. Observing the accuracy (from r_{IAG} = 0.231 to r_{IAG} = 0.405) of selection indexes constructed by Radojković et al. (2009) for the assessment of sows breeding value on the basis of their reproductive indicators and accuracy (from r_{IAG} = 0.318 to r_{IAG} = 0.821) of selection indexes for assessment of gilts breeding value displayed by Brkić (2002) it can be concluded that the accuracy of mixed selection indexes is somewhere in the middle between the accuracy of these two groups of indexes. The reason for lower accuracy of selection indexes for assessment of animal breeding value on the basis of their reproductive performances could be that these traits have a low heritability what negatively affects the accuracy of obtained estimation of index so all this influenced the assessment of animal breeding value on the basis of the liveweight gain and carcass quality traits to have medium to high heritability by means of selection indexes which found a broad application in practice (Cleveland and See, 2006). What is evident when we speak about the liveweight gain trait and carcass quality trait included in the model for the assessment of swine breeding value is that the daily liveweight gain and backfat thickness are the traits that have a primary place in selection in this kind of animals (Suzuki et al., 2005; Kralik et al., 2007; Popovac et al., 2014).

Conclusion

Analysing metodological procedure for the construction of selection indices we arrived at the conclusion that this is a relatively simple method by which we can assess animal genetic potential and select breeding animals in the production conditions in which it is not possible to use more complex selection methods. It should also be pointed out that selection indices involving liveweight gain and carcass quality traits as well as reproductive traits represent a good method applied to assess sow breeding value since it provides a unique numerical value as sublimation of positive and negative values of these two groups of equally important traits in sow selection.

Acknowledgement

The research has been financed by the Ministry of Science and Technological Development of the Republic of Serbia as part of the Project TR31081.

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