

ANALYSIS OF INTRAVITAL ASSESSMENT RESULTS IN PUREBRED AND CROSSBRED BOARS

W. Milewska, J. Falkowski, M. Čechová

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Abstract

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1879 purebred boars: Duroc (D), Hampshire (H) and Pietrain (Pn) as well as their two-crossbreds (D x H, H x D, Pn x H, H x Pn, Pn x D, D x Pn) were analysed after a living assessment completed between 1995–1998 within the area of activity of the Animal Breeding Station in Olsztyn. The standardized daily gains in body weight ranged between 594 g (H) and 628 g (Pn x D). The thinnest backfat layer was observed in Pietrain boars and their crossbred boars. The height of loin eye was the best for boars Pn and for all crossbred animals. The lean content in the body of the assessed boars ranged from 56.2% (H) to 60.0% (Pn). The highest value of selection index was found for Pn boars (124 points) and crossbred boars Pn x D and Pn x H, the lowest index value was observed for purebred H boars (109 points). The correlation coefficient between the index and daily gains range from 0.69 ($P \leq 0.01$) (H) to 0.91 ($P \leq 0.01$) (H x D), between the index and the height of loin eye range from 0.57 ($P \leq 0.01$) (H) to 0.75 ($P \leq 0.01$) (Pn) and between the index and the lean content range from 0.13 ($P \leq 0.05$) (H) to 0.71 ($P \leq 0.01$) (Pn).

purebred and hybrid boars, daily gain, backfat, lean content

Not only directed breeding work but also the proper transfer of the achievements in breeding to production pig farms are important for an increase in lean content in the Polish swine livestock (Rozycki, 1999). According to Polish regulations, for several years now crossbred boars from purebred males have been accepted in trade, however, not many publications have been published on the analysis of their fattening and lean performance (Czarnecki et al., 1999). Čechová et al. (2002) and Sládek et al. (2003) evaluated results of fattening ability and carcass value in pigs after hybrid boars Pn x H or D x H too. Pulkrábek et al. (1996) and Kernerová et al. (1996) mention the results of production traits test in offspring after pure bred boars Duroc and Hampshire.

This paper includes an analysis of intravital assessment results in Duroc, Hampshire and Pietrain purebred and their two-crossbred boars.

MATERIAL AND METHODS

The analysis included the results of 1879 purebred boars: Duroc (D), Hampshire (H) and Pietrain (Pn) as well as their two-crossbreds (D x H, H x D, Pn x H, H x Pn, Pn x D, D x Pn) obtained after a living assessment completed between 1995–1998 within the area of activity of the Animal Breeding Station in Olsztyn. The assessment was carried out according to the obligatory methodology Eckert, Szyndler (1996) and the selection index was calculated including standardized daily gains in body weight (as for day 180 of boars life) and the body lean content.

Backfat thickness at P2 and P4 (mm) and height of loin eye at P4M (mm) were measured with a PIGLOG 105 ultrasound apparatus. The measurement results were used for lean content in boar's body (%).

The results were statistically processed with the use of a one-factor variance analysis. The significances of

the differences between the genetic groups were calculated with the Duncan test. Moreover, correlation coefficients (r) between the selection index and boars traits (used for calculation of the index) were calculated.

RESULTS

The data included in Table I show that the standardized daily gains in body weight (as for day 180 of boar's life) ranged between 594 g (H) and 628 g (Pn x D). Among the purebred animals boars D had better results than H or Pn ($P < 0.01$), however, slightly lower than the average calculated for all the assessed Duroc boars in 1998 in Poland by Bzowska et al. (1999) and the results reported by Grudniewska, Milewska (2000). Grudniewska et al. (2000) found 35 g higher gains in Pietrain boars than in this paper. It should be emphasized that all the assessed crossbred boars had better gains in body weight than the purebred animals. This agrees with the results of other authors (Czarnecki et al., 1999; Czarnecki et al., 1999; Eckert, Žak, 1999). The gains in cross-bred boars Pn x D were significantly higher than those of other groups (Graph 1).

Backfat layer at P2 for all groups was thicker than at P4. The thinnest backfat layer (less than 10 mm) was observed in Pietrain boars and their crossbred boars and the differences between groups were statistically significant ($P < 0.01$). These results are in agreement with the results of other authors (Bobček, Řeháček, 2000; Michalska, Nowachowicz, 2000; Rozycki, 1999). Also the height of loin eye was the best for boars Pn and for all crossbred animals. However, the purebred Duroc and Hampshire animals had the worst results of this trait in comparison to the other groups ($P < 0.01$).

The lean content in the body of the assessed boars was high and on average ranged from 56.2% (H) to 60.0% (Pn). The thickest backfat and the lowest height of loin eye in Hampshire boars were responsible for the lowest lean content in their body (Graph 1), whereas the Pietrain crossbred boars showed better leanness in comparison to the animals of other crosses. Based on the results obtained by German (Brandt, 2000) the difference in lean content between boars Pn and Pn x H was only 0.5–0.6%. In this paper, however, this difference was higher (1.1%) and statistically significant ($P < 0.01$). Czarnecki et al. (1999) reported a similar lean content in boars Pn, D x Pn and Pn x D but slightly lower in boars D (55%).

The highest value of selection index was found for Pietrain boars (124 points) and crossbred boars Pn x

D and Pn x H. Eckert, Žak (1999) claimed that Pietrain sows crossbred with Duroc boars produce more valuable boars than boars being the result of Pietrain sows crossbred with Hampshire boars. The lowest index value was observed for purebred Hampshire boars (109 points). These results, however, give evidence for high breeding value. In 1998 boars with the index of 117 and higher points were qualified to class E and animals with the index of between 108 and 116 points were classified to class I.

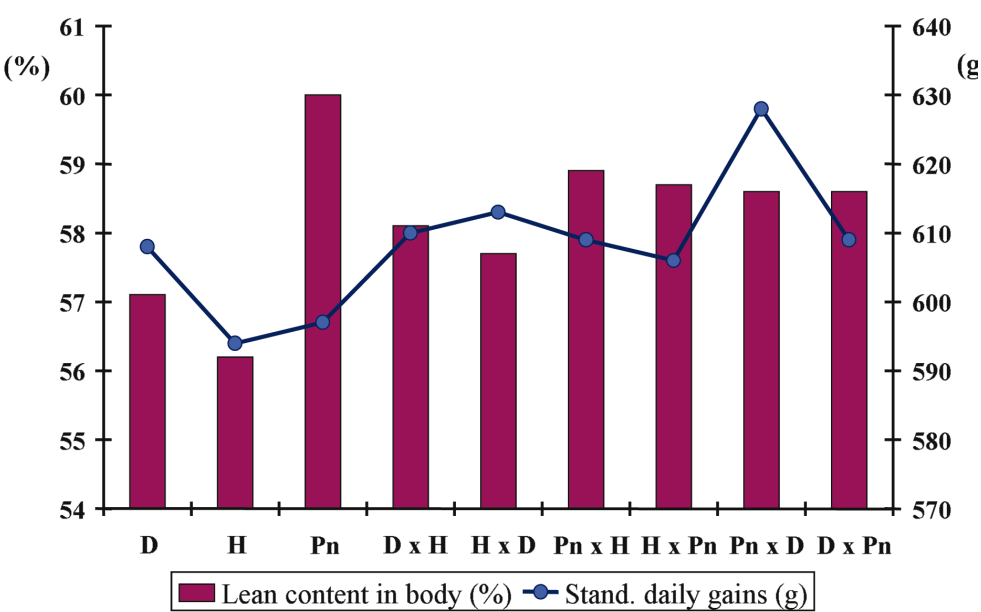
Comparing the results of the assessment of crossbred animals: D x H, H x D, Pn x H, H x Pn, Pn x D and D x Pn it can be claimed that only in the case of crossbreeding Duroc with Pietrain, more advantageous effects were obtained when sow was Pietrain. In the other variations the differences were insignificant.

Genetic distance between Pietrain and Duroc breeds is small (Janik et al., 1996), but their crossbreeding may give good effects mainly in the improvement of growth rate and meat quality in crossbred animals thanks to Duroc genetic contribution (Falkowski, Milewska, 2000; Rozycki, 1999).

The correlations between the selection index and the fattening (standardized daily gains in body weight) and leanness (backfat thickness, height of loin eye, lean content) performance traits were presented in Table II. Milewska, Grudniewska (1999) mention that the selection index of intravital assessment is to a larger degree correlated with daily gains in boars body weight than with the lean content. Similar results report Michalska, Nowachowicz (2000). The correlation coefficient between the index and daily gains range from 0.69 ($P \leq 0.01$) (H) to 0.91 ($P \leq 0.01$) (H x D), between the index and the height of loin eye range from 0.57 ($P \leq 0.01$) (H) to 0.75 ($P \leq 0.01$) (Pn) and between the index and the lean content range from 0.13 ($P \leq 0.05$) (H) to 0.71 ($P \leq 0.01$) (Pn). The correlations between the index and the backfat in purebred boars D, Pn and crossbred boars Pn x D and D x Pn are negative and highly significant.

CONCLUSION

The best results in respect of the fattening performance were found for boar being the offspring of Pietrain mothers and Duroc fathers, however, in respect of the leanness performance – purebred Pietrain boars and Pietrain crossbred boars. Highly significant correlation between the index value of intravital assessment and the standardized daily gains indicates that the boar's breeding value assessed this way is a sufficient selection criterion.



1: Standardized daily gains (g) and meat content (%) in the boar's body

I: Results of boar intravital assessment

Traits	Statistic	Genotype (♀ x ♂)								
		D n = 241	H n = 153	Pn n = 1898	D x H n = 117	H x D n = 66	Pn x H n = 96	H x Pn n = 419	Pn x D n = 207	D x Pn n = 974
Stand. daily gains (g)	- x s	608 ^{BE} 55	594 ^{DEFHc} 70	597 ^{DDGb} 61	610 ^{BGH} 62	613 ^a 71	609 ^{BD} 59	606 ^{BF} 48	628 ^A 54	609 ^{BC} 45
Backfat thickness at P2 (mm)	- x s	10.8 ^B 2.2	11.8 ^A 2.7	8.8 ^I 1.5	10.5 ^{BD} 1.8	10.8 ^{BC} 1.8	9.7 ^{EG} 1.8	9.6 ^{EH} 1.8	9.9 ^E 1.9	9.8 ^{EF} 1.7
Backfat thickness at P4 (mm)	- x s	9.9 ^{BC} 2.3	11.3 ^A 2.6	8.5 ^I 1.5	9.8 ^{BD} 1.9	10.3 ^B 2.0	9.3 ^{DE} 1.3	9.2 ^{EF} 1.6	9.2 ^{EG} 1.7	9.2 ^{EH} 1.7
Height of loin eye at P4M (mm)	- x s	45.9 ^{HJ} 3.4	46.1 ^H 3.4	51.8 ^A 5.4	49.1 ^{BC} 4.3	49.0 ^{BF} 5.1	50.3 ^B 4.3	49.0 ^{BE} 3.8	49.1 ^{BD} 4.5	48.8 ^{CDEFG} 4.1
Lean content in body (%)	- x s	57.1 ^H 2.0	56.2 ^I 2.3	60.0 ^A 1.7	58.1 ^{DF} 1.6	57.7 ^{FGH} 1.5	58.9 ^{BC} 1.4	58.7 ^B 1.6	58.6 ^{BD} 1.8	58.6 ^{BE} 1.6
Selection index (points)	- x s	115 ^F 12	109 ^G 9	124 ^{AH} 14	119 ^{BC} 13	118 ^{BEF} 14	122 ^{ACEH} 11	120 ^{BD} 8	124 ^A 12	120 ^B 10

P ≤ 0.05 – a,b P ≤ 0.01 – A,B Means within rows denoted by different letters differ significantly

II: Correlation coefficients between selection index and traits of boars

Genotype	n	Traits				
		Stand. daily gains	Backfat thickness at P2	Backfat thickness at P4	Height of loin eye at P4M	Lean content in body
D	241	0.76**	-0.35**	-0.37**	0.68**	0.63**
H	153	0.69**	0.09	0.06	0.57**	0.13*
Pn	1898	0.89**	-0.14**	-0.18**	0.75**	0.71**
D x H	117	0.87**	-0.12	-0.09	0.74**	0.58**
H x D	66	0.91**	-0.04	0.02	0.68**	0.56**
Pn x H	96	0.87**	0.06	0.05	0.66**	0.44**
H x Pn	419	0.72**	0.05	0.07	0.58**	0.39**
Pn x D	207	0.84**	-0.26**	-0.31**	0.68**	0.67**
D x Pn	974	0.79**	-0.29**	-0.30**	0.66**	0.67**

* - $P \leq 0.05$ ** - $P \leq 0.01$

SOUHRN

Analýza výsledků intravitálního odhadu u čistokrevných a hybridních kanců

Celkem 1879 čistokrevných kanců plemene Duroc (D), Hampshire (H) a Pietrain (Pn) a jejich kříženců (D x H, H x D, Pn x H, H x Pn, Pn x D, D x Pn) bylo analyzováno po ukončení textace vlastní užitkovosti v letech 1995–1998 na stanici chovu zvířat v Olsztyně. Průměrný denní přírůstek se pohyboval od 594 g (H) do 628 g (Pn x D). Nejnížší vrstva hřbetního tuku byla zjištěna u kanců plemene Pietrain a kříženců tohoto plemene. Také výška nejdelšího zádového svalu byla nejlepší u kanců plemene Pietrain a u kříženců. Podíl libového masa sledovaných kanců se pohyboval od 56,2 % (H) do 60,0 % (Pn). Nejvyšší hodnota selekčního indexu byla zjištěna u kanců plemene Pietrain (124 bodů) a kříženců Pn x D a Pn x H, nejnižší u kanců plemene Hampshire (109 bodů). Koeficienty korelace mezi indexem a denním přírůstkem se pohybovaly od 0,69 ($P \leq 0,01$) (H) do 0,91 ($P \leq 0,01$) (H x D), mezi indexem a výškou svalu od 0,57 ($P \leq 0,01$) (H) do 0,75 ($P \leq 0,01$) (Pn) a mezi indexem a procentem libového masa od 0,13 ($P \leq 0,05$) (H) do 0,71 ($P \leq 0,01$) (Pn).

čistokrevní a hybridní kanci, denní přírůstek, hřbetní tuk, podíl libového masa

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Address

Dr. Wanda Milewska, Prof. Dr. hab. Janusz Falkowski, Uniwersytet Warmińsko-Mazurski w Olsztynie, Wydział bioinżynierii zwierząt, Katedra Hodowli Trzody Chlewnej, ul. Oczapowskiego 5, 10-719 Olsztyn-Kortowo, Polska, Doc. Ing. Marie Čechová, CSc., Ústav chovu a šlechtění zvířat, Mendelova zemědělská a lesnická univerzita v Brně, Zemědělská 1, 613 00 Brno, Česká republika