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The relationships between the performance test results of young crossbred boars

Związki zachodzące pomiędzy wynikami oceny przyżyciowej knurków mieszańców

Jerzy NOWACHOWICZ*, Grażyna MICHALSKA
Tomasz BUCEK and Przemysław Dariusz WASILEWSKI

*University of Technology and Life Sciences in Bydgoszcz, Faculty of Animal Breeding and Biology, Department of Animal Products Evaluation, Kordeckiego 20, 85-225 Bydgoszcz, Poland, *correspondence e-mail: surzwierz@utp.edu.pl*

ABSTRACT

The relationships between the most important results of performance test of 3.876 young crossbred boars, expressed as calculated correlation coefficients were determined. The animals came from 6 crossing variants: Hampshire x Belgian Landrace (H x BL), Hampshire x Duroc (H x D), Hampshire x Pietrain (H x P), Duroc x Pietrain (D x P), Pietrain x Hampshire (P x H) and Pietrain x Duroc (P x D). Young crossbred boars were performance tested in years 2004-2008 in Poland in Bydgoszcz Breeding Region. The traits taken into account were: age and body weight on the test day, daily gain of body weight standardized on 180th day of life, backfat thickness in P_2 and P_4 points, height of loin eye in P_4 point, lean meat content and the performance test selection index. In a total results summary from years 2004-2008 in tested groups of young crossbred boars (except H x BL) negative and in most cases statistically high significant correlations were proved between the growth rate and standardized backfat thickness in P_2 and P_4 points and in young crossbred boars came from 3 following crossing variants: H x BL, P x H, P x D negative and statistically high significant correlation coefficients were observed between the daily gain of body weight and standardized lean meat content, which may show the unfavourable impact of high growth rate on meat content.

Keywords: correlation coefficients, performance test, young crossbred boars

ABSTRAKT

Określono związki zachodzące pomiędzy najważniejszymi wynikami oceny przyżyciowej 3.876 knurków mieszańców, wyrażonymi w postaci obliczonych współczynników korelacji. Zwierzęta pochodziły z 6 wariantów krzyżowania: hampshire x belgijska zwisłoucha (h x bz), hampshire x duroc (h x d), hampshire x pietrain (h x p), duroc x pietrain (d x p), pietrain x hampshire (p x h) i pietrain x duroc

(p x d). Knurki mieszańce zostały poddane ocenie przyżyciowej w latach 2004-2008 w Polsce w bydgoskim okręgu hodowlanym. Branymi pod uwagę cechami były: wiek i masa ciała w dniu oceny, przyrost dobowy masy ciała standaryzowany na 180. dzień życia, grubość słoniny w punktach P_2 i P_4, wysokość oka polędwicy w punkcie P_4, zawartość mięsa w ciele oraz indeks selekcyjny oceny przyżyciowej. W łącznym zestawieniu wyników z lat 2004-2008 u badanych grup knurków mieszańców (z wyjątkiem h x bz) stwierdzono ujemne i w większości przypadków statystycznie wysoko istotne korelacje między tempem wzrostu a standaryzowaną grubością słoniny w punktach P_2 i P_4, a u knurków mieszańców pochodzących z 3 następujących wariantów krzyżowania: h x bz, p x h, p x d wykazano ujemne i statystycznie wysoko istotne współczynniki korelacji pomiędzy przyrostem dobowym masy ciała a standaryzowaną zawartością mięsa, które mogą świadczyć o niekorzystnym wpływie wysokiego tempa wzrostu na mięsność.

Słowa kluczowe: knurki mieszańce, ocena przyżyciowa, współczynniki korelacji

DETAILED ABSTRACT

Celem pracy było określenie związków zachodzących pomiędzy najważniejszymi wynikami oceny przyżyciowej 3.876 knurków mieszańców, wyrażonych w postaci obliczonych współczynników korelacji. Zwierzęta pochodziły z 6 wariantów krzyżowania: hampshire x belgijska zwisłoucha (h x bz), hampshire x duroc (h x d), hampshire x pietrain (h x p), duroc x pietrain (d x p), pietrain x hampshire (p x h) i pietrain x duroc (p x d). Knurki mieszańce wyprodukowano w Polsce w bydgoskim okręgu hodowlanym zlokalizowanym w województwie kujawsko-pomorskim. Zwierzęta zostały poddane ocenie przyżyciowej w latach 2004-2008 zgodnie z obowiązującą metodyką (Eckert i Szyndler-Nędza, 2005, 2011). Obliczono współczynniki korelacji pomiędzy najważniejszymi wynikami oceny przyżyciowej, tj. przyrostem dobowym masy ciała standaryzowanym na 180. dzień życia, standaryzowaną zawartością mięsa w ciele i indeksem selekcyjnym oceny przyżyciowej a pozostałymi następującymi cechami oceny przyżyciowej: wiekiem i masą ciała w dniu oceny, standaryzowaną grubością słoniny w punktach P_2 i P_4, standaryzowaną wysokością oka polędwicy w punkcie P_4. Obliczono także współczynniki korelacji pomiędzy trzema najważniejszymi parametrami oceny przyżyciowej: przyrostem dobowym masy ciała standaryzowanym na 180. dzień życia, procentową zawartością mięsa w ciele standaryzowaną na 180. dzień życia, indeksem selekcyjnym oceny przyżyciowej. Statystyczne opracowanie wyników przeprowadzono przy pomocy wzorów podanych przez Ruszczyca (1981) i programu komputerowego Statistica 8.0 PL (2008). W łącznym zestawieniu wyników z lat 2004-2008 u badanych grup knurków mieszańców (z wyjątkiem h x bz) stwierdzono ujemne i w większości przypadków statystycznie wysoko istotne korelacje między tempem wzrostu a standaryzowaną grubością słoniny w punktach P_2 i P_4, a u knurków mieszańców pochodzących z 3 następujących wariantów krzyżowania: h x bz, p x h, p x d wykazano ujemne i statystycznie wysoko istotne współczynniki korelacji pomiędzy przyrostem dobowym masy ciała a standaryzowaną zawartością mięsa, które mogą świadczyć o niekorzystnym wpływie wysokiego tempa wzrostu na mięsność. Wykazano wysokie współczynniki korelacji między tempem wzrostu i standaryzowaną zawartością mięsa w ciele a indeksem selekcyjnym oceny

przyżyciowej, które w łącznym zestawieniu wyników z lat 2004-2008 wszystkich badanych knurków mieszańców wynosiły odpowiednio: 0,734** i 0,678**.

INTRODUCTION

In a modern pig breeding and production the increasing role is played by crossbred boars used in breeding and the commercial crossing. They have more favourable results in range of economically important traits i.e. breeding performance and the possibility of their longer use as compared to the pure breed animals. It is confirmed by the results of many authors' studies (Czarnecki, et al., 1999; Fent, et al., 1980; Kapelański, 1995; Knap, 1987; Michalska, 1996; Michalska, et al., 2004, 2010; Milewska, 2007; Milewska and Falkowski, 2001; Neely and Robison, 1983; Neely, et al., 1980; Nowachowicz, et al., 2009; Różycki, 1995). In a Polish pig breeding and keeping the boars of breeds: Hampshire, Duroc, Pietrain and two-breed crossbreds came from the reciprocal crossing determine the paternal component and are performance tested. It should be mentioned that till year 2006 only boars of Belgian Landrace breed and their crossbreds were performance tested and in a following years abandoned their production and evaluation (Eckert and Szyndler-Nędza, 2011). The results of own research (Michalska, et al., 2010) indicate that among tested crossing variants the most favourable results of the performance test had the young crossbred boars came from Hampshire sows and Pietrain boars. The analysis of performance test results including the relationships between their particular traits, informed by the genetic and phenotypic correlations gives the possibility to determine changes which take place in specified populations (Buczyński, et al., 1998, 2001; Nowicki, et al., 1994).
The aim of presented paper was to determine the relationships between the most important results of performance test of young crossbred boars came from different crossing variants, conducted in years 2004-2008 in Poland in Bydgoszcz Breeding Region.

MATERIAL AND METHODS

The relationships between the most important results of performance test of 3.876 young crossbred boars were determined, expressed as calculated correlation coefficients. The animals were produced in Poland in Bydgoszcz Breeding Region, located in the area of Kujawy-Pomorze Province. Young crossbred boars were performance tested conducted in years 2004-2008 according to the obligatory methodology (Eckert and Szyndler-Nędza, 2005, 2011).
The lean meat content of young crossbred boars (LM) was calculated on the base of ultrasound measurements done with PIGLOG 105 probe of backfat thickness in P_2 and P_4 points and the height of loin eye in P_4 point regarding to the following formula (Eckert and Szyndler-Nędza, 2005, 2011):

$$LM = -0.4203\ P_2 - 0.4461\ P_4 + 0.2469\ P_4M + 54.8763$$

where:
P_2 – backfat thickness measured behind the last rib (on the border line of pectoral and lumbar vertebras) 3 cm from the back medial line (mm),
P_4 - backfat thickness measured behind the last rib (on the border line of pectoral and lumbar vertebras) 8 cm from the back medial line (mm),
P_4M – measurement of the height of the loin eye in P_4 point (mm).

Selection index of the performance test was estimated regarding to the following formula (Eckert and Szyndler-Nędza, 2005, 2011):

for paternal lines: $I = 0.1364X_1 + 4.7820X_2 – 268.0839$

where:
X_1 – daily gain standardized on 180th day of life
X_2 – percentage lean meat content.

They came from the 6 following crossing variants, where the sow's breed was given in first position and boar's breed in second position: Hampshire x Belgian Landrace (H x BL), Hampshire x Duroc (H x D), Hampshire x Pietrain (H x P), Duroc x Pietrain (D x P), Pietrain x Hampshire (P x H) and Pietrain x Duroc (P x D). The performance test results of the mentioned young crossbred boars were presented in other publication (Michalska, et al., 2010).
The correlation coefficients were calculated between the most important traits of performance test, i.e. daily gain of body weight standardized on 180th day of life, standardized lean meat content, the performance test selection index and the following traits of performance test:

- age on test day (days),
- body weight on test day (kg),
- standardized backfat thickness in P_2 point (mm) measured by PIGLOG 105 apparatus,
- standardized backfat thickness in P_4 point (mm) measured by PIGLOG 105 apparatus,
- standardized height of loin eye in P_4 point (mm) measured by PIGLOG 105 apparatus.

The correlation coefficients between three most important parameters of the performance test were calculated:

- daily gain of body weight standardized on 180th day of life (g),
- percentage lean meat content standardized on 180th day of life (%),
- performance test selection index (points).

The results were statistically elaborated using the formulas given by Ruszczyc (1981) and computer program Statistica 8.0 PL (2008). The number (n) of tested young crossbred boars in analyzed 5 years i.e. 2004, 2005, 2006, 2007, 2008 and in a total results summary 2004-2008 was shown below:

Crossing variant	Year					
	2004	2005	2006	2007	2008	Total
Hampshire x Belgian Landrace	18	37	-	-	-	55
Hampshire x Duroc	34	78	76	26	-	214
Hampshire x Pietrain	30	134	68	54	71	357
Duroc x Pietrain	92	382	487	515	404	1880
Pietrain x Hampshire	58	207	-	97	126	488
Pietrain x Duroc	82	385	-	185	230	882
Total	314	1223	631	877	831	3876

RESULTS

Table 1 gives the correlation coefficients between the daily gain of body weight standardized on 180th day of life and the remaining parameters of performance test of tested young crossbred boars came from different crossing variants in analyzed years, i.e. 2004-2008. Negative and almost in all cases high significant relationships were determined between the growth rate and age on the performance test day. Generally, in the most cases positive and statistically high significant correlation coefficients were observed between the growth rate and the body weight on performance test day. The different results were determined in this range in the crossbreds came from H x BL crossing variant performance tested in 2004 and 2005, where r=-0.765** and -0.671**. The relationships between the daily gain of body weight and standardized backfat thickness measured in P_2 and P_4 points of young crossbred boars came from different crossing variants in the firstly tested years, i.e. 2004 and 2005 were quite differentiated and in the remaining years were negative and generally statistically high significant. In a total results summary from years 2004-2008 of all tested young crossbred boars the correlation coefficients between the growth rate and standardized backfat thickness in P_2 and P_4 points were -0.302** and -0.155**, respectively and in a particular crossbred groups shaped at the level from -0.450** and -0.511** (H x D) up to 0.436** and 0.275* (H x BL). Generally positive and in many cases statistically high significant or significant correlation coefficients were observed between the daily gain of body weight and the standardized height of loin eye measured in P_4 point. Totally for all tested young crossbred boars (2004-2008) r=0.223** and in a particular groups of crossbreds r=0.065 (H x BL); 0.302** (H x D); 0.236** (H x P); 0.266** (D x P); 0.119** (P x H); 0.096** (P x D). The correlations between the daily gain of body weight and standardized lean meat content of young crossbred boars came from particular crossing variants in the analyzed years varied. In a total results summary from years 2004-2008 in case of 3 groups of young crossbred boars they were negative and statistically high significant: -0.680** (H x BL); -0.168** (P x H); -0.135** (P x D). In remaining young crossbred boars groups they were positive: 0.295** (H x D); 0.113* (H x P); 0.024 (D x P). In animals came from tested crossing variants (except H x BL crossbred group) in analyzed years the growth rate was positively and highly significant correlated with performance test selection index. The correlation coefficient of a total results summary from years 2004-2008 of all tested young crossbred boars was high and amounted 0.734** and in particular groups, except H x

BL (r=-0.105) also shaped at high level amounting: 0.756** (H x D); 0.759** (H x P); 0.750** (D x P); 0.650** (P x H); 0.679** (P x D).

Table 1. Correlations between the daily gain of body weight of young boars standardized on 180th day of life and the remaining traits of performance test
Tabela 1. Korelacje między przyrostem dobowym masy ciała knurków standaryzowanym na 180. dzień życia a pozostałymi cechami oceny przyżyciowej

Young crossbred boars	Correlation coefficients (r) between the daily gain of body weight and:						
	Age on test day	Body weight on test day	Standardized backfat thickness in P_2 point	Standardized backfat thickness in P_4 point	Standardized height of loin eye in P_4 point	Standardized lean meat content	Performance test selection index
year 2004							
H x BL	-0.945**	-0.765**	0.594**	0.616**	0.452	-0.492*	0.180
H x D	-0.290	0.571**	-0.506**	-0.308	0.208	0.388*	0.810**
H x P	-0.583**	0.131	-0.220	0.025	0.412*	-0.098	0.607**
D x P	-0.803**	0.322**	0.037	0.304**	0.336**	-0.484**	0.733**
P x H	-0.258	0.407**	-0.280*	0.285*	0.275*	0.108	0.647**
P x D	-0.601**	0.406**	0.185	-0.003	0.146	-0.284**	0.504**
Total	-0.606**	0.329**	-0.022	0.126*	0.254**	-0.236**	0.627**
year 2005							
H x BL	-0.943**	-0.671**	0.452**	0.151	0.077	-0.697**	-0.045
H x D	-0.688**	0.172	-0.365**	0.722**	0.369**	0.053	0.635**
H x P	-0.733**	-0.033	0.203*	0.142	0.288**	-0.448**	0.483**
D x P	-0.556**	0.521**	-0.088	-0.025	0.176**	-0.123*	0.654**
P x H	-0.694**	0.274**	-0.048	0.062	0.149*	-0.409**	0.511**
P x D	-0.512**	0.376**	0.181**	0.221**	0.116	-0.402**	0.549**
Total	-0.587**	0.364**	0.021	0.068*	0.166**	-0.290**	0.583**
year 2006							
H x BL	-	-	-	-	-	-	-
H x D	-0.567**	0.543**	-0.415**	-0.459**	0.290*	0.271*	0.773**
H x P	-0.267*	0.636**	-0.075	-0.159	-0.081	-0.206	0.710**
D x P	-0.513**	0.530**	-0.250**	-0.109*	0.207**	-0.045	0.675**
P x H	-	-	-	-	-	-	-
P x D	-	-	-	-	-	-	-
Total	-0.492**	0.527**	-0.231**	-0.132**	0.179**	-0.042	0.669**

Table 1 - continuation
c.d. Tabeli 1

Young crossbred boars	Correlation coefficients (r) between the daily gain of body weight and:						
	Age on test day	Body weight on test day	Standardized backfat thickness in P_2 point	Standardized backfat thickness in P_4 point	Standardized height of loin eye in P_4 point	Standardized lean meat content	Performance test selection index
year 2007							
H x BL	-	-	-	-	-	-	-
H x D	-0.665**	0.284	-0.343	-0.616**	-0.070	-0.134	0.730**
H x P	-0.466**	0.683**	-0.292*	-0.007	-0.0004	-0.176	0.788**
D x P	-0.471**	0.621**	-0.322**	-0.111	0.220**	0.051	0.728**
P x H	-0.559**	0.739**	-0.637**	-0.451**	0.162	0.168	0.866**
P x D	-0.334**	0.766**	-0.593**	-0.406**	0.153*	0.238**	0.877**
Total	-0.449**	0.698**	-0.463**	-0.259**	0.201**	0.128**	0.806**
year 2008							
H x BL	-	-	-	-	-	-	-
H x D	-	-	-	-	-	-	-
H x P	-0.545**	0.742**	-0.621**	-0.586**	0.004	0.377**	0.914**
D x P	-0.708**	0.660**	-0.494**	-0.363**	0.332**	0.097	0.867**
P x H	-0.303**	0.348**	-0.284**	-0.150	0.034	-0.068	0.678**
P x D	-0.309**	0.633**	-0.485**	-0.290**	0.164*	0.180**	0.813**
Total	-0.545**	0.646**	-0.517**	-0.335**	0.277**	0.149**	0.866**
Population averge 2004-2008							
H x BL	-0.937**	-0.699**	0.436**	0.275*	0.065	-0.680**	-0.105
H x D	-0.340**	0.472**	-0.450**	-0.511**	0.302**	0.295**	0.756**
H x P	-0.452**	0.537**	-0.287**	-0.304**	0.236**	0.113*	0.759**
D x P	-0.577**	0.573**	-0.319**	-0.174**	0.266**	0.024	0.750**
P x H	-0.513**	0.408**	-0.287**	-0.053	0.119**	-0.168**	0.650**
P x D	-0.434**	0.529**	-0.225**	-0.042	0.096**	-0.135**	0.679**
Total	-0.503**	0.549**	-0.302**	-0.155**	0.223**	0.0006	0.734**

* - statistically significant correlation coefficients P≤0.05
** - statistically significant correlation coefficients P≤0.01

Table 2 gives the correlation coefficients between the standardized lean meat content of tested young crossbred boars and the remaining traits of the performance test. In almost all cases positive and generally highly significant correlation coefficients between the lean meat content and age and body weight on the performance test day were observed. The standardized lean meat content of tested young crossbred boars was negatively and in most cases highly significant correlated with the fat content characterized by the standardized backfat thickness measured in P_2 and P_4 points. Regarding to the total results of all animals came from tested crossing variants in years 2004-2008, the correlation coefficients between the meat content and standardized backfat content in P_2 and P_4 points were -0.607** and -0.541**, respectively and in a particular crossbred groups shaped at the level from -0.501** and -0.473** (H x BL) up to -0.788** and -0.731** (H x D). Positive (except the result of P x H individuals from 2008) and mostly high significant or significant correlations between the meat content and the standardized height of loin eye were observed. The correlation coefficient of all tested young crossbred boars (2004-2008) was 0.473** and in a particular groups of the young crossbred boars shaped from 0.166** in P x H up to 0.599** in D x P. Positive and highly significant or significant correlations between the standardized lean meat content of tested young crossbred boars and their performance test selection index were proved. In a total results summary from years 2004-2008 in case of all young crossbred boars the correlation coefficient was high and amounted 0.678** and in a particular groups of young crossbred boars assumed high values, as follows: 0.799** (H x BL); 0.849** (H x D); 0.733** (H x P); 0.678** (D x P); 0.640** (P x H); 0.629** (P x D).

Table 2. Correlations between the standardized lean meat content of young boars and the remaining traits of performance test

Tabela 2. Korelacje między standaryzowaną zawartością mięsa w ciele knurków a pozostałymi cechami oceny przyżyciowej

Young crossbred boars	Correlation coefficients (r) between the standardized lean meat content and:						
	Age on test day	Body weight on test day	Daily gain of body weight standardized on 180th day of life	Standardized backfat thickness in P_2 point	Standardized backfat thickness in P_4 point	Standardized height of loin eye in P_4 point	Performance test selection index
year 2004							
H x BL	0.561*	0.563*	-0.492*	-0.399	-0.415	0.360	0.765**
H x D	0.264	0.546**	0.388**	-0.802**	-0.554**	0.439**	0.854**
H x P	0.738**	0.814**	-0.098	-0.681**	-0.368*	0.141	0.731**
D x P	0.393**	-0.247*	-0.484**	-0.415**	-0.490**	0.293**	0.240*
P x H	0.513**	0.546**	0.108	-0.621**	-0.375**	0.251	0.827**
P x D	0.594**	0.365**	-0.284**	-0.636**	-0.477**	0.367**	0.599**
Total	0.512**	0.335**	-0.236**	-0.560**	-0.473**	0.247**	0.578**
year 2005							
H x BL	0.725**	0.635**	-0.697**	-0.705**	-0.541**	0.356*	0.747**
H x D	0.434**	0.604**	0.053	-0.853**	-0.710**	0.266*	0.804**
H x P	0.500**	0.230**	-0.448**	-0.682**	-0.545**	0.294**	0.566**
D x P	0.517**	0.411**	-0.123*	-0.547**	-0.495**	0.670**	0.670*
P x H	0.718**	0.454**	-0.409**	-0.536**	-0.454**	0.176*	0.575**
P x D	0.702**	0.393**	-0.402**	-0.530**	-0.489**	0.352**	0.544**
Total	0.612**	0.403**	-0.290**	-0.569**	-0.482**	0.438**	0.608**
year 2006							
H x BL	-	-	-	-	-	-	-
H x D	0.300**	0.612**	0.271*	-0.424**	-0.409**	0.658**	0.820**
H x P	0.333**	0.095	-0.206	-0.073	-0.176	0.526**	0.541**
D x P	0.552**	0.497**	-0.045	-0.657**	-0.467**	0.601**	0.707**
P x H	-	-	-	-	-	-	-
P x D	-	-	-	-	-	-	-
Total	0.547**	0.492**	-0.042	-0.647**	-0.445**	0.573**	0.714**

Table 2 - continuation
c.d. Tabeli 2

Young crossbred boars	Correlation coefficients (r) between the standardized lean meat content and:						
	Age on test day	Body weight on test day	Daily gain of body weight standardized on 180th day of life	Standardized backfat thickness in P_2 point	Standardized backfat thickness in P_4 point	Standardized height of loin eye in P_4 point	Performance test selection index
year 2007							
H x BL	-	-	-	-	-	-	-
H x D	0.642**	0.679**	-0.134	-0.387	-0.117	0.514**	0.579**
H x P	0.473**	0.190	-0.176	-0.359**	-0.180	0.603**	0.467**
D x P	0.540**	0.528**	0.051	-0.633**	-0.434**	0.540**	0.721**
P x H	0.439**	0.557**	0.168	-0.609**	-0.531**	0.347**	0.639**
P x D	0.572**	0.614**	0.238**	-0.626**	-0.559**	0.205**	0.676**
Total	0.522**	0.549**	0.128**	-0.633**	-0.473**	0.462**	0.690**
year 2008							
H x BL	-	-	-	-	-	-	-
H x D	-	-	-	-	-	-	-
H x P	-0.037	0.431**	0.377**	-0.555**	-0.573**	0.471**	0.719**
D x P	0.317**	0.455**	0.097	-0.639**	-0.586**	0.491**	0.579**
P x H	0.701**	0.632**	-0.068	-0.593**	-0.297**	-0.075	0.686**
P x D	0.694**	0.711**	0.180**	-0.658**	-0.635**	0.023	0.718**
Total	0.459**	0.572**	0.149**	-0.647**	-0.586**	0.285**	0.623**
Population average 2004-2008							
H x BL	0.751**	0.703**	-0.680**	-0.501**	-0.473**	0.451**	0.799**
H x D	0.595**	0.788**	0.295**	-0.788**	-0.731**	0.314**	0.849**
H x P	0.449**	0.524**	0.113*	-0.595**	-0.581**	0.509**	0.733**
D x P	0.478**	0.497**	0.024	-0.629**	-0.514**	0.599**	0.678**
P x H	0.661**	0.538**	-0.168**	-0.554**	-0.478**	0.166**	0.640**
P x D	0.716**	0.547**	-0.135**	-0.556**	-0.584**	0.310**	0.629**
Total	0.561**	0.535**	0.0006	-0.607**	-0.541**	0.473**	0.678**

* - statistically significant correlation coefficients P≤0.05
** - statistically significant correlation coefficients P≤0.01

Table 3 gives the correlation coefficients between the performance test selection index and the remaining tested parameters. The correlations between the performance test selection index and age on the test day in specified groups of crossbreds in particular years varied (from negative to positive). In a total results summary from years 2004-2008 of all tested animals were close to 0. In a particular years and in a total results summary from years 2004-2008 it is seen positive and significantly high correlations between the selection index and the body weight on performance test day and also the growth rate of all tested young crossbred boars, except H x BL group. The correlation coefficients of all tested young crossbred boars (2004-2008) in this range were high and amounted 0.765** and 0.734**, respectively. The negative and mostly high significant correlations between the performance test selection index and the backfat thickness in P_2 and P_4 points. In a total results summary from years 2004-2008 of all tested young crossbred boars the correlation coefficients were -0.633** and -0.481**, respectively. In a particular years and in a total results summary from 5 analyzed years positive (except P x H animals tested in 2008) and generally high significant correlations were observed between the performance test selection index and the standardized height of loin eye in P_4 point. In tested groups of young crossbred boars in analyzed years a high correlation between the performance test selection index and the standardized lean meat content was observed, what was discussed in detail in interpreting the results given in Table 2. Regarding to the total results of all young crossbred boars (2004-2008) it may be seen, that the performance test selection index was a slightly more correlated with the daily gain of body weight (r=0.734**) than with the standardized lean meat content of tested young crossbred boars (r=0.678**). However, in animals came from H x BL and H x D crossing variants the trends were reversed.

Table 3. Correlations between the selection index of young boars and the remaining traits of performance test

Tabela 3. Korelacje między indeksem selekcyjnym knurków a pozostałymi cechami oceny przyżyciowej

Young crossbred boars	Correlation coefficients (r) between the selection index and:						
	Age on test day	Body weight on test day	Daily gain of body weight standardized on 180th day of life	Standardized backfat thickness in P_2 point	Standardized backfat thickness in P_4 point	Standardized height of loin eye in P_4 point	Standardized lean meat content
year 2004							
H x BL	-0.063	0.072	0.180	-0.015	0.004	0.750**	0.765**
H x D	0.003	0.668**	0.810**	-0.795**	-0.519**	0.401**	0.854**
H x P	0.186	0.735**	0.607**	-0.702**	-0.270	0.402*	0.731**
D x P	-0.585**	0.166	0.733**	-0.277**	-0.040	0.604**	0.240*
P x H	0.244	0.644**	0.647**	-0.631**	-0.126	0.353**	0.827**
P x D	0.023	0.581**	0.504**	-0.369**	-0.427**	0.339**	0.599**
Total	-0.097	0.524**	0.627**	-0.446**	-0.272**	0.377**	0.578**
year 2005							
H x BL	0.135	0.259	-0.045	-0.573**	-0.614**	0.566**	0.747**
H x D	-0.074	0.569**	0.635**	-0.877**	-0.766**	0.426**	0.804**
H x P	-0.187*	0.193*	0.483**	-0.481**	-0.405**	0.554**	0.566**
D x P	-0.021	0.704**	0.654**	-0.483**	-0.395**	0.642**	0.670**
P x H	0.056	0.675**	0.511**	-0.547**	-0.371**	0.299**	0.575**
P x D	0.170**	0.701**	0.549**	-0.319**	-0.243**	0.427**	0.544**
Total	0.032	0.643**	0.583**	-0.466**	-0.353**	0.509**	0.608**
year 2006							
H x BL	-	-	-	-	-	-	-
H x D	-0.139	0.726**	0.773**	-0.530**	-0.545**	0.601**	0.820**
H x P	0.011	0.615**	0.710**	-0.118	-0.265*	0.307*	0.541**
D x P	0.045	0.742**	0.675**	-0.662**	-0.422**	0.589**	0.707**
P x H	-	-	-	-	-	-	-
P x D	-	-	-	-	-	-	-
Total	0.062	0.734**	0.669**	-0.643**	-0.425**	0.551**	0.714**

Table 3 - continuation
c.d. Tabeli 3

Young crossbred boars	Correlation coefficients (r) between the selection index and:						
	Age on test day	Body weight on test day	Daily gain of body weight standardized on 180th day of life	Standardized backfat thickness in P_2 point	Standardized backfat thickness in P_4 point	Standardized height of loin eye in P_4 point	Standardized lean meat content
year 2007							
H x BL	-	-	-	-	-	-	-
H x D	-0.108	0.697**	0.730**	-0.553**	-0.583**	0.301	0.579**
H x P	-0.123	0.731**	0.788**	-0.481**	-0.118	0.379**	0.467**
D x P	0.044	0.792**	0.728**	-0.658**	-0.375**	0.523**	0.721**
P x H	-0.213*	0.860**	0.866**	-0.806**	-0.620**	0.303**	0.639**
P x D	0.030	0.886**	0.877**	-0.761**	-0.584**	0.217**	0.676**
Total	-0.017	0.836**	0.806**	-0.716**	-0.471**	0.423**	0.690**
year 2008							
H x BL	-	-	-	-	-	-	-
H x D	-	-	-	-	-	-	-
H x P	-0.426**	0.743**	0.914**	-0.709**	-0.693**	0.207	0.719**
D x P	-0.422**	0.768**	0.867**	-0.724**	-0.589**	0.517**	0.579**
P x H	0.300**	0.720**	0.678**	-0.637**	-0.330**	-0.030	0.686**
P x D	0.192**	0.868**	0.813**	-0.733**	-0.582**	0.128	0.718**
Total	-0.200**	0.800**	0.866**	-0.736**	-0.561**	0.363**	0.623**
Population average 2004-2008							
H x BL	0.249	0.376**	-0.105	-0.338*	-0.414**	0.664**	0.799**
H x D	0.219**	0.800**	0.756**	-0.790**	-0.784**	0.383**	0.849**
H x P	-0.016	0.711**	0.759**	-0.586**	-0.590**	0.496**	0.733**
D x P	-0.108**	0.750**	0.750**	-0.650**	-0.468**	0.591**	0.678**
P x H	0.110*	0.733**	0.650**	-0.649**	-0.409**	0.222**	0.640**
P x D	0.187**	0.813**	0.679**	-0.585**	-0.464**	0.296**	0.629**
Total	0.011	0.765**	0.734**	-0.633**	-0.481**	0.483**	0.678**

* - statistically significant correlation coefficients P≤0.05
** - statistically significant correlation coefficients P≤0.01

DISCUSSION

The level of productivity in range of economically important utility traits, including traits connected with the performance test of specified breeds, lines and crossbreds of pigs breed in a particular countries and regions is diversed and changes in time (Bobček, et al., 2002; Buczyński, et al., 1999; Eckert and Szyndler-Nędza, 2005, 2011; Fandrejewski, et al., 2001; Haferland, 1985; Michalska and Nowachowicz, 2002; Michalska, et al., 2004, 2010; Milewska and Falkowski, 2001; Nowachowicz, et al., 2009). Between the particular traits relationships occur, which inform i.e. correlation coefficients. Their height in pigs of particular breeds, lines and crossbreds shapes at different level (Buczyński, et al., 1998, 2001; Falkenberg, et al., 1988, 1989; Michalska and Nowachowicz, 2002; Michalska, et al., 2005, 2008). In a presented paper in a total results summary from years 2004-2008 in young crossbred boars came from 3 following crossing variants: H x BL, P x H, P x D negative and statistically high significant correlation coefficients were observed between the daily gain of body weight and the standardized lean meat content. They may show the unfavourable impact of the high growth rate on the meat content. In the previous own research (Michalska and Nowachowicz, 2002; Michalska, et al., 2005, 2008) a similar trends were observed in the young boars of Polish Large White, Belgian Landrace, Hampshire, Line 990 and the crossbreds after fathers of Pietrain breed and mothers of Złotnicka Spotted, Polish Large White, Hampshire and Duroc breed performance tested in years 1995-2004, when the previous methodology applied. Milewska and Grudniewska (1999) observed also negative correlation coefficients between the daily gain of body weight and lean meat content of young boars of Polish Large White, Polish Landrace, Hampshire and Duroc breed performance tested according to previous methodology, they amounted -0.194; -0.551**; -0.214; -0.186, respectively. The results of other authors (Buczyński, et al., 2001; Cameron and Curran, 1995a, 1995b; Kanis, 1988; Kapelański, et al., 2002; Koczanowski, et al., 2001; Milewska and Falkowski, 2001; Urbańczyk, et al., 1999) also suggest, that the high growth rate may unfavorably impacts on the slaughter value not leading to expected improvement of meat content and causing increase of fat content (especially in ad-libitum feeding). It should be noticed that in presented paper in case of 3 groups of young crossbred boars, i.e. H x D, H x P, D x P in a total results summary (2004-2008) the correlation coefficients between the growth rate and the standardized meat content were positive, thus the animals came from these crossing variants obtained more favourable results in this range than H x BL, P x H, P x D crossbreds.

In the previous own research (Michalska, et al., 2010) concerning the performance test of the same animals the results in range of the daily gain of body weight standardized on 180th day of life and lean meat content of tested groups of young crossbred boars were diversed. In a total results summary from 5 analyzed years (2004 – 2008) the animals came from H x BL, P x H and P x D crossing variants regarding to the daily gain of body weight and standardized lean meat content on 180th day of life had worse results than H x D, H x P and D x P crossbreds. Regarding to that the values of the correlation coefficients between the daily gain of body weight and lean meat content in 6 tested groups of pigs were diversed from negative in H x BL, P x H and P x D groups to positive in young crossbred boars of H x D, H x P and D x P crossing variants.

CONCLUSIONS

Summarising obtained results it should be stated that in a total results summary from years 2004-2008 in tested groups of young crossbred boars (except H x BL) negative and in most cases statistically high significant correlations were observed between the growth rate and the standardized backfat thickness in P_2 and P_4 points and in young crossbred boars came from H x BL, P x H, P x D crossing variants negative and statistically high significant correlation coefficients were proved between the daily gain of body weight and the standardized lean meat content, which may show the unfavourable impact of high growth rate on meat content.

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