INFLUENCE OF THE SHARE OF MEAT AND OF THE SEX ON CHOSEN QUANTITATIVE TRAITS IN HYBRID PIGS*

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The objective of the work was to determine the influence of the attained share of meat and of sex on chosen quantitative traits in hybrid pigs. 117 (58 barrows and 59 gilts) pcs of abattoir swine of the following genotypes were included into the experiment: (CLW_s x PN) x (CLW_m x CL), (H x PN) x (CLW_m x CL), (D x PN) x (CLW_m x CL) and firm product PIC x (CLW_m x CL). The pigs were divided according to the grading criteria – share of lean meat – into 3 groups, it is 60.0% and more, 55.0–59.9% and 50.0–54.9% of lean meat. The right carcass half was cut into individual "meat parts"– ham, loin, shoulder and neck. From the results of the measuring it is resulting, that the highest weight and proportion of MMP – meat (23.9 kg and 54.98%), weight and proportion of head, hocks and trotters (5.2 kg and 12.01%), MLLT area (5296 mm^2), weight/proportion of ham, loin, shoulder and neck (10.2, 6.1, 4.6 and 2.9 kg / 23.46, 14.06, 10.72 and 6.72%) is shown by the pigs, which have had the lean meat 60.0% and more. The upper-most height of the weight and proportion of MMP – fat (7.8 kg and 17.72%), weight and proportion of flare fat and jowl (9.6 kg and 22.02%) and average backfat thickness (21 mm) was measured in the groups with 50.0–54.9% share of meat. In terms of sex were ascertained more higher chosed traits at gilts. Statistically significant differences have been found further between lean meat and sex.

pig; carcass value; lean meat; quantitative traits; sex

INTRODUCTION

The meaning of the evaluation of carcass swine according to the share of the lean meat (it is the share of the muscle) in the carcass body emphasized Branscheid et al. (1987).

The quantitative traits of the carcass value of the different hybrid combinations analyzed Pulkrábek et al. (1993, 1996, 1997, 2004, 2006), Demo et al. (1996), Matoušek et al. (1991, 1997), Krška et al. (1999), Šimek et al. (2004).

According to Tvrdoň (2001), the genetic level of the bred swine, the nourishment, the slaughter weight, sex and environmental conditions belong to the factors influencing the share of the lean meat.

Pulkrábek et al. (1997) state, that with the stirpiculture for the increasing of the share of the muscle in the whole body the considerable increasing of the share of the meaty parts and to this corresponding the big decrease of the share of the fatty parts occur.

Babatude et al. (1966) describe the relations between the characters of carcass value with respect for the content of fat in the carcass half. The authors point out the higher mutual dependence between the subcutaneous fat and extracted fat of the carcass half ($r = 0.72$) or between the subcutaneous fat and the height of the dorsal fat ($r = 0.89$).

Bruwe et al. (1991) found out the highest share of the fat at the pig, the lower one at gilts and the lowest at barrows. Fewson et al. (1990) found out statistically significant influence of sex for the growth of the share of ham, shoulder and belly in the carcass body with the growing of the carcass weight.

Wajda and Bielecki (1991) compared and evaluated the efficiency and carcass value of 309 young boars and 320 castrates and gilts in the course of fattening up to the weight of 105 kg. The higher representation of the meaty parts at collateral decrease of the separable fat at the group of barrows was evidenced.

Koucký et al. (1993) observed the influence of the sex (boars, barrows and gilts) on the index of carcass value. The weight of the right half was at the observed groups 48.0, 47.8 and 45.8 kg. The percentage of the lean meat was 50.04%, 44.33% and 49.12%.

MATERIAL AND METHOD

The objective of the work was to determine the influence of the attained share of meat and of sex on chosen quantitative traits in hybrid pigs.

The abattoir swine of the following genotypes were included into the experiment: (CLW_s x PN) x (CLW_m x CL) = (Czech Large White x Pietrain) x (Czech Large White x Czech Landrace), (H x PN) x (CLW_m x CL) = (Hampshire x Pietrain) x (Czech Large White x Czech Landrace), (D x PN) x (CLW_m x CL) = (Duroc x Pietrain) x (Czech Large White x Czech Landrace) and PIC x (CLW_m x CL) = firm product PIC x (Czech Large White x Czech Landrace).

The test procedures were realized at the test station Ploskov, Lány.

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The bringing and stabling of the swine was performed according to the methodology for the testing procedure of the pedigree and hybrid swine. The pigs were classified into the test in an average weight c. 25 ± 2.5 kg (same age and well-balanced sex – barrows / gilts) and of an average age 65–70 days from the birth. The feeding was carried out by means of full feeding mixture (FFM), which contained three components (wheat, barley, soybean extracted meal) and feeding supplement, mixed for every pen separately according to the already mentioned methodology.

For the evaluation of the quantitative indicators of carcass value there was, after the attainment of the overall average live weight 104.8–117 kg in the age of 156–194 days from the birth, the pigs were slaughter, commercialized in the slaughter-house by the system SEUROP by the method ZP (Pulkrábek, 2001; Pulkrábek et al., 2004) and further subjected to the carcass analysis.

The right carcass side was divided into primal cuts according to Scheper and Scholz (1985). Detailed carcass dissections were performed according to the reference method of the European Union (Walstra, Merkus, 1996) which is based on the separation and weighing of different tissues from ham, loin, shoulder, neck and belly with bones.

At the right carcass half the following indices of carcass value were observed:

Quantitative traits, thus

- lean meat share in %,
- warm right half weight in kg,
- weight of main meaty parts – meat in kg,
- main meaty parts proportion – meat in %,
- weight of main meaty parts – fat in kg,
- main meaty parts proportion – fat in %,
- weight of flare fat and jowl in kg,
- proportion of flare fat and jowl in %,
- weight of head, hocks and trotters in kg,
- proportion of head, hocks and trotters in %,
- MLLT area in mm^2 (over the last thoracic vertebra),
- average backfat thickness in mm (average of fat thickness 1 – over 2nd thoracic vertebra, 2 – over the last thoracic vertebra, 3 – over 1st sacral vertebra),
- weight of ham (meat + bone) in kg,
  - loin (meat + bone) in kg,
  - shoulder (meat + bone) in kg,
  - neck (meat + bone) in kg,
- proportion of ham (meat + bone) in %,
  - loin (meat + bone) in %,
  - shoulder (meat + bone) in %,
  - neck (meat + bone) in %.

According to the grading criteria – the share of the lean meat – 117 pigs (58 barrows and 59 gilts) were divided into 3 groups (Table 1).

Table 1. Distribution of pigs according to the share of the lean meat

Quality class	Lean meat (%)	Barrows	Gilts	Total
S	60.0 and more	11	24	35
E	55.0–59.9	29	32	61
U	50.0–54.9	18	13	21

The obtained results were evaluated by the statistical programme SAS® Propriety Software Release 6.04, formulated in tables, whereas the differences between the individual traits were tested by GLM procedure on mutual interactions between lean meat and sex.

RESULTS

With the respect to the grading criteria there are in Table 2 the fundamental statistical characteristics and the results of the variation analyses for the selected characteristics of the carcass value of the meat.

Preliminary it is necessary to state beforehand, that from the operational reasons it was not possible to select for the observation the individuals with the uniform "optimum" slaughter weight. On the ground of mutual trade of choice parameters were the dates corrected and voiced to warm weight of both carcass, i.e. to average dead weight 91 kg.

By monitoring average weight of the main meaty parts (MMP) – meat/fat the highest value 23.9/7.8 kg, resp. 54.98/17.72% have been found in the group with the share of the lean meat 60.0% and more/50.0–54.9%. Next group was with the share of lean muscle 55.0–59.9%, when the average weight values of the meaty parts – meat/fat were 22.6/7.0 kg, resp. 52.03/16.06% proportion of MMP in carcass halves. The lowest weights of MMP – meat/fat were shown by the group with the share of lean muscle 50.0–54.9/60.0% and more, i.e. 21.5/5.8 kg, resp. 49.38/13.30%. Demo et al. (1996) presented proportion of MMP in the interval of 45.48–50.68% in pigs.

The values of weight, resp. proportion of flare fat and jowl were in the range 7.1–9.6 kg, or 16.36–22.02%, resp. The highest values of weight, resp. proportion of flare fat and jowl were found in the group with 50.0–54.9% lean meat and the lowest in the group with lean meat 60.0% and more.

The highest values of weight, resp. proportion of head, hocks and trotters (5.2 kg, 12.01%), were measured in the group with the share of the lean meat 60.0% and more, the lowest (5.0 kg, 11.59%) with share of meat 55.0–59.9%. Pulkrábek et al. (1996) also reported in the range 5.35–5.97 kg weight of head, hocks and trotters with respect to lean meat.

As regards the highest MLLT area, 5296 mm^2 was ascertained at the group with the share of the lean meat 60.0% and more, on the contrary, the lowest value 4417 mm^2 was measured in the group with share of meat 50.0–54.9%. Matoušek et al. (1997) also presented the surface of the area MLLT 5180 mm^2.

The assumed highest average height of backfat (21 mm) was measured in the group with 50.0–54.9% share of meat, on the contrary the lowest height 15 mm was eject in the group with share of meat 60.0% and more. Koucký et al. (1993) reported in boars, barrows and gilts the average height of backfat 30.4, 33.9 and 28.6 mm.

The highest weight, resp. proportion of ham, loin, shoulder and neck (10.2, 6.1, 4.6 and 2.9 kg/23.46, 14.06,

Table 2. Quantitative traits of the carcass value

Indices	Lean meat (%)			Sex		Significance	
	60.0 and more	55.0–59.9	50.0–54.9	Barrows	Gilts	Lean meat	Sex
	(n = 35)	(n = 61)	(n = 21)	(n = 58)	(n = 59)		
	$\bar{x}$ ± SD	$\bar{x}$ ± SD	$\bar{x}$ ± SD	$\bar{x}$ ± SD	$\bar{x}$ ± SD		
Lean meat proportion (%)	62.02 ^{a} ± 1.50	57.70 ^{b} ± 1.46	53.31 ^{c} ± 1.45	57.07 ± 3.39	59.32 ± 2.85	< 0.0001	0.4821
Warm right half weight (kg)	43.7 ± 0.66	43.6 ± 0.83	43.7 ± 0.68	43.7 ± 0.73	43.7 ± 0.78	0.9155	0.7085
Weight of MMP – meat (kg)	23.9 ^{a} ± 1.05	22.6 ^{b} ± 1.01	21.5 ^{c} ± 1.08	22.3 ^{a} ± 1.33	23.3 ^{b} ± 1.12	< 0.0001	0.0225
MMP proportion – meat (%)	54.98 ^{a} ± 2.20	52.03 ^{b} ± 1.89	49.38 ^{c} ± 2.15	51.24 ^{a} ± 2.64	53.61 ^{b} ± 2.43	< 0.0001	0.0044
Weight of MMP – fat (kg)	5.8 ^{a} ± 0.67	7.0 ^{b} ± 0.66	7.8 ^{c} ± 0.58	7.1 ^{a} ± 0.90	6.5 ^{b} ± 0.88	< 0.0001	0.0456
MMP proportion – fat (%)	13.30 ^{a} ± 1.32	16.06 ^{b} ± 1.46	17.72 ^{c} ± 1.49	16.29 ^{a} ± 2.03	14.79 ^{b} ± 1.95	< 0.0001	0.0405
Flare fat and jowl (kg)	7.1 ^{a} ± 0.83	8.5 ^{b} ± 0.79	9.6 ^{c} ± 0.69	8.7 ^{a} ± 1.10	7.9 ^{b} ± 1.06	< 0.0001	0.0382
Flare fat and jowl proportion (%)	16.36 ^{a} ± 0.57	19.63 ^{b} ± 0.68	22.02 ^{c} ± 0.45	20.10 ^{a} ± 0.56	18.09 ^{b} ± 0.78	< 0.0001	0.0335
Head, hocks and trotters (kg)	5.2 ^{a} ± 0.39	5.0 ^{b} ± 0.27	5.0 ^{b} ± 0.31	5.0 ± 0.33	5.1 ± 0.31	0.0156	0.3947
Head, hocks and trotters proportion (%)	12.01 ^{a} ± 0.95	11.59 ^{b} ± 0.58	11.66 ^{ab} ± 0.67	11.70 ± 0.71	11.76 ± 0.77	0.0174	0.4980
MLLT area (mm^2)	5296 ^{a} ± 611.02	4861 ^{b} ± 583.08	4417 ^{c} ± 465.76	4764 ± 627.85	5061 ± 630.73	< 0.0001	0.9835
Average backfat thickness (mm)	15 ^{a} ± 3.45	18 ^{b} ± 3.57	21 ^{b} ± 3.45	19 ^{a} ± 3.98	16 ^{b} ± 3.34	0.0008	0.0049
Weight of ham (kg)	10.2 ^{a} ± 0.61	9.4 ^{b} ± 0.57	8.8 ^{c} ± 0.61	9.3 ± 0.73	9.8 ± 0.69	<0.0001	0.1493
– loin (kg)	6.1 ± 0.45	5.9 ± 0.48	5.6 ± 0.35	5.7 ^{a} ± 0.45	6.1 ^{b} ± 0.45	0.1108	0.0095
– shoulder (kg)	4.6 ^{a} ± 0.19	4.4 ^{b} ± 0.29	4.2 ^{c} ± 0.34	4.3 ± 0.34	4.5 ± 0.26	< 0.0001	0.4770
– neck (kg)	2.9 ± 0.23	2.8 ± 0.39	2.7 ± 0.20	2.8 ± 0.22	2.8 ± 0.41	0.3035	0.6999
Proportion of ham (%)	23.46 ^{a} ± 1.42	21.80 ^{b} ± 1.16	20.39 ^{c} ± 1.22	21.48 ± 1.51	22.60 ± 1.57	< 0.0001	0.0829
– loin (%)	14.06 ± 0.94	13.61 ± 1.02	13.00 ± 0.73	13.24 ^{a} ± 0.91	14.02 ^{b} ± 0.96	0.0922	0.0030
– shoulder (%)	10.72 ^{a} ± 0.46	10.18 ^{b} ± 0.60	9.64 ^{c} ± 0.80	10.02 ± 0.72	10.46 ± 0.61	<0.0001	0.5125
– neck (%)	6.72 ± 0.53	6.43 ± 0.92	6.32 ± 0.44	6.48 ± 0.50	6.52 ± 0.96	0.3459	0.6302

^{abc} $P \leq 0.05$, $\bar{x}$ – mean, SD – standard error of the mean, MMP – main meaty parts, MLLT – *musculus longissimus lumborum et thoracis*

10.72, 6.72%) were measured in the group with share of meat 60.0% and more, on the contrary, the lowest weight, resp. proportion 8.8, 5.6, 4.2 and 2.7, resp. 20.39, 13.00, 9.64 and 6.32 were eject in the group with 50.0–54.9% share of meat. P u l k r á b e k et al. (2004) documented the proportion of loin (10.92%), shoulder (10.46%) and ham (20.48%) in final hybrids produced in Czech Republic with the average lean meat share 54.50%.

At barrows were measured the higher values of weight and proportion of MMP – fat, weight and share of flare fat and jowl and average backfat thickness than at gilts. The same values 45.1, 43.7 and 2.8 kg were detected by indices warm right half weight and weight of neck.

The statistically significant differences were ascertained among groups of lean meat, except of the warm right half weight, weight and proportion of loin and neck.

In terms of evaluation of the differences between sex, it can be stated, that have been found by values – weight of MMP – meat and fat, MMP proportion – meat and fat, weight and proportion of flare fat and jowl, average backfat thickness, weight and proportion of loin ($P \leq 0.05$).

CONCLUSION

From the results of measuring it follows that

- with the higher share of meat the weight and proportion of MMP – fat, weight and proportion of flare fat and jowl and average backfat thickness were declined,
- with the higher share of meat the weight and proportion of MMP – meat, weight and proportion of ham, loin, shoulder and neck were increased,
- at barrows were the higher values of weight and proportion of MMP – fat, weight and proportion of flare fat and jowl and average backfat thickness than at gilts,
- at barrows and gilts were detected the same values (45.1, 43.7 and 2.8 kg) of the warm right half weight and weight of neck,
- statistically significant differences have been found further between lean meat and sex.

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Vliv podílu libové svaloviny a pohlaví na vybrané kvantitativní ukazatele vepřového masa.

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Cílem práce bylo stanovit vliv podílu masa a pohlaví na vybrané kvantitativní ukazatele jatečné hodnoty.

Do pokusu bylo zařazeno celkem 117 jatečných prasat (58 vepříků a 59 prasniček) těchto genotypů: (ČBU x ČL) x (ČBU x PN) = (české bílé ušlechtilé x česká landrase) x (české bílé ušlechtilé x pietrain), (ČBU x ČL) x PIC = (české bílé ušlechtilé x česká landrase) x firemní produkt PIC, (ČBU x ČL) x (H x PN) = (české bílé ušlechtilé x česká landrase) x (hampshire x pietrain) a (ČBU x ČL) x (D x PN) = (české bílé ušlechtilé x česká landrase) x (duroc x pietrain).

Prasata byla rozdělena podle třídícího kritéria – podílu libového masa – do tří skupin, a to 60,0 % a více, 55,0–59,9 % a 50,0–54,9 % libové svaloviny. Pravá jatečná půlka byla rozbourána na jednotlivé jatečné partie. Detailní jatečná disekce byla provedena podle referenční metody používané v Evropské unii.

Z výsledků měření vyplývá, že nejvyšší hodnoty u parametrů hmotnost a podíl hlavních masitých částí (dále HMČ) – maso (23,9 kg a 54, 98 %), hmotnost a podíl hlavy, kolen a nožek (5,2 kg a 12,01%), plocha MLLT (5296 mm^2), hmotnost/podíl kýty, pečeně, plece a krkovice (10,2, 6,1, 4,6 a 2,9 kg / 23,46, 14,06, 10,72 a 6,72 %) – byly zjištěny u prasat, která vykazovala 60 a více procent libové svaloviny v jatečném těle. Nejvyšší hodnoty hmotnosti a podílu HMČ – tuk (7,8 kg a 17,72 %), hmotnosti a podílu plsního tuku a laloku (9,6 kg a 22,02 %) a průměrné výšky hřbetního tuku (21 mm) byly naměřeny u skupiny s 50,0–54,9% podílem libového masa.

V rámci pohlaví byly zjištěny u většiny sledovaných ukazatelů vyšší hodnoty ve prospěch prasniček.

Statisticky významné rozdíly byly nalezeny mezi podíly svaloviny i pohlavím.

prase; jatečná hodnota; libové maso; kvantitativní ukazatele; pohlaví

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