

CARCASS AND MEAT QUALITY OF ZŁOTNICKA SPOTTED PIGS IN COMPARISON TO POLISH LARGE WHITE X POLISH LANDRACE CROSSBRED PIGS

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Abstract

The experiment was carried out on 32 purebred Złotnicka Spotted pigs and 20 crossbreds Polish Large White x Polish Landrace. Rearing and feeding were similar for all animals. Złotnicka Spotted fatteners were slaughtered at about 107 kg live body weight however crossbred pigs at about 119 kg live body weight according to the meat industry standards. Meat physico-chemical traits were determined in the *longissimus lumborum* (LL) muscle. The determined meat characteristics covered the pH₁ and pH_u records, visual assessment of colour and exudation on fresh meat samples, drip loss, colorimeter Minolta measurements of lightness (L), a*, b* values and tenderness. Significance of differences (Duncan's test) between groups was identified using STATISTICA 8.0 PL packet. Złotnicka Spotted pigs showed lower body weight at slaughter and cold carcass weight (107.09 kg and 77.28 kg) than pigs from F₁ group (119.80 kg and 89.93 kg); P≤0.01. Carcass fatness as determined by mean backfat thickness was smaller in crossbred pigs (2.01 cm) than in purebred fatteners (2.75 cm); P≤0.01. Złotnicka Spotted pig's meat showed a lower drip loss (P≤0.01), darker and more desirable colour (P≤0.01). Values of the all analysed traits were within ranges characterizing good meat quality of Złotnicka Spotted pigs.

Key Words: Fatteners, carcass and meat characteristics, Złotnicka Spotted pig

Złotnicka Spotted pigs are one of the three native breeds in Poland. Population of these pigs is very small and because of these they were included in the genetic resources conservation programmes (Szyndler-Nędza, 2006). Złotnicka Spotted pigs show a very high meat quality and nutritional properties (Janicki and Kortz, 1973; Kapelański et al., 1999; Kapelański et al., 2006; Florowski et al., 2006). Meat of Złotnicka Spotted pigs exhibited a high technological suitability expressed by good texture parameters and high water holding capacity. Moreover, meat of this pigs had dark and more desirable colour and also contained more intramuscular fat. Additionally, this native breed of pigs is characterized by high prolificacy and good maternal ability (Szyndler-Nędza, 2006).

The aim of the study was to compare the quality of carcass and meat obtained from pigs of the Złotnicka Spotted and two-breed fatteners.

Material and Methods

The experiment was carried out on 32 purebred Złotnicka Spotted (ZS) pigs and 20 F₁ crossbreds Polish Large White x Polish Landrace (PLWxPL). Animals were managed and fed similarly, according to current standards. Pigs were fed of mixture contained 12.6 MJ/kg metabolizable energy and 156 g crude protein. Złotnicka Spotted fatteners were slaughtered at about 107 kg live body weight however crossbred pigs at about 119 kg live body weight according to the meat industry standards.

One day post-slaughter, the right carcass-sides were

dissected and evaluated using the simplified methods applied to Polish Pig Testing Stations (Różycki, 1996). Thickness of the backfat was measured in five points: above the shoulder, between the last thoracic vertebra and the first lumbar vertebra and on the sacral vertebra – I, II, III. The loin cross section area was measured behind last rib. The loin eye area was measured by planimetry of the photographs with the help of computer Lucia software.

Meat quality analyses were performed in the *longissimus lumborum* muscle (LL). Value of pH₁ was recorded using a pistol pH-meter (R. Matthaüs), and ultimate pH_u was measured in minced meat-water slurry 48h after slaughter. Visual assessment of colour and wateriness on fresh meat samples was performed by a trained panel according to a five point scale, where score 3 was judged as an optimal value. Drip loss was recorded on about 2 cm thick slice of meat (Honikel, 1987). Tenderness of meat was measured using Intron 3342 with Warner-Bratzler attachment (Szalata et al., 1999). Meat colour was determined using colorimeter Minolta CR 310 to obtain L, a* and b* values (Itten, 1997).

Calculated were arithmetic means and their standard deviations. One-way analysis of variance was performed using Duncan's test. STATISTICA 8.0 PL packet (2007) was used.

Results and Discussion

In Table 1 are presented the results of carcass measurements. Body weight at slaughter and cold carcass weight showed some variation. The crossbred animals

(Polish Large White x Polish Landrace) were heavier at the slaughter (119.80 kg) and also had heavier cold carcass weight (89.93 kg) than purebred ZS pigs (107.09 kg and 77.28 kg respectively); $P \leq 0.01$. The fatness of pig carcasses were characterized by backfat thickness which was measured in five points. Statistically significant differences were shown for backfat thickness measured in four points (with the exception measurement over last rib) and also in the mean between compared pig breeds. Crossbred F_1 pigs showed thicker backfat than purebred animals. In the report by Grześkowiak et al. (2007) on ZS fatteners approved higher fat deposition than in the experiment presented herein. Long lasting research lead by Rak et al. (1999) on Złotnicka Spotted pigs indicated the decrease of backfat thickness (from 3.59 cm to 3.25 cm) during the period of about 30 years. The basic parameter of the carcass muscling is loin cross section. The loin eye area was highly significant smaller in purebred pigs as against to PLWxPL crossbred pigs (32.35 cm² versus 52.13 cm²) and corresponded to the data reported by others authors (Rak et al. 1999; Kapelański et al. 2006).

Data referring to meat quality of compared breeds are contained in Table 2. The rate of meat acidification in the first hour after slaughter was not considerably different, however significant differences were identified for pH measured 48 hours after slaughter.

Higher value of pH_u had animals of ZS (5.50) than animals of F_1 group (5.43). Similar results were described by Grześkowiak et al. (2007) and Florowski et al. (2006). The meat obtained from native pigs compared to that of PLWxPL crossbreds was characterized by a lower drip loss and darker colour. An important trait describing the exudation and loss of meat weight during storage and its distribution is the volume of drip loss from meat. A lower drip loss was characteristic of meat from purebred group of pigs as compared with crossbreds and it was 2.53% and 4.38% respectively; $P \leq 0.01$. Rasmussen and Andresson (1996) indicated that high (disadvantageous) drip loss maybe caused by muscle protein denaturation, cold store shrinkage and low pH_1 value. Visual assessment of colour and wateriness on fresh meat samples was analyzed. Złotnicka Spotted fatteners had darker colour scores ($P \leq 0.01$) and better wateriness score ($P \leq 0.05$) than two-breed pigs (3.1 and 2.9 versus 2.7 and 2.7). Objective colour measurement was estimated using a colorimeter Minolta CR 310 to obtain L, a* and b* values. Comparison of both groups showed that ZS pigs were superior in this respect. They had darker and more favorable meat colour (L 48.35); ($P \leq 0.01$). According to research carried out by Florowski et al. (2006) the darker and more desirable colour characteristics is observed in meat of Złotnicka Spotted fatteners than two others studied purebred pigs.

Table 1. Slaughter value of carcasses obtained from Złotnicka Spotted and F_1 crossbred fatteners

Trait	Breed/Crossbred	
	Złotnicka Spotted	Polish Large White x Polish Landrace
Body weight at slaughter, kg	107.09 ^B ± 7.35	119.80 ^A ± 13.98
Cold carcass weight, kg	77.28 ^B ± 7.68	89.93 ^A ± 12.83
Backfat thickness, cm		
over shoulder	3.81 ^B ± 0.89	2.70 ^A ± 0.64
over last rib	2.35 ± 0.72	1.99 ± 0.55
over sacrum I	2.70 ^B ± 0.84	2.03 ^A ± 0.56
over sacrum II	2.14 ^B ± 0.60	1.36 ^A ± 0.43
over sacrum III	2.73 ^B ± 0.71	1.96 ^A ± 0.49
Average of 5 measurements, cm	2.75 ^B ± 0.69	2.01 ^A ± 0.45
Loin cross section area, cm ²	32.35 ^B ± 4.49	52.13 ^A ± 11.80

A, B at $P \leq 0.01$

Table 2. Quality traits of pork meat obtained from Złotnicka Spotted and F₁ crossbred fatteners

Trait	Breed/Crossbred	
	Złotnicka Spotted	Polish Large White x Polish Landrace
pH ₁	6.23 ± 0.45	6.24 ± 0.49
pH _u	5.50 ^a ± 0.09	5.43 ^b ± 0.13
Drip loss, %	2.53 ^A ± 1.34	4.38 ^B ± 2.10
Visual appraisal		
Colour, score	3.1 ^A ± 0.32	2.7 ^B ± 2.76
Wateriness, score	2.9 ^a ± 0.17	2.7 ^b ± 0.28
Objective colour measurement		
Minolta L	48.35 ^B ± 2.68	52.54 ^A ± 3.05
a*	16.97 ^A ± 0.55	15.90 ^B ± 0.71
b*	2.54 ^B ± 1.18	3.56 ^A ± 1.40
Tenderness, N/cm	44.54 ± 13.85	44.27 ± 6.97

A, B at P≤0.01; a, b at P≤0.05

Conclusion

Summarizing, one may state that carcasses obtained from Złotnicka Spotted pigs was characterized by larger fatness and smaller loin cross section area than two-breed crossbreds though purebred pigs had a better quality of meat than pigs F₁. Złotnicka Spotted meat showed a lower drip loss, darker and more desirable colour. These values of Złotnicka Spotted qualify them for production of traditional products (for example dry cured hams).

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