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Institute of Genetics and Animal Breeding, Jastrzębiec, Poland

Slaughter value of once-bred gilts *vs.* their littermates fattened according to common standards*

Wojciech Kapelański, Milena Biegniewska**

Department of Pig Breeding, University of Technology and Life Sciences in Bydgoszcz, Mazowiecka 28, 85-084 Bydgoszcz, Poland

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Used were two groups of crossbred littermate gilts. Group A gilts (n = 34) were slaughtered after rearing their first litter, while group B (n = 39) were gilts fattened according to the procedure commonly used in pig production, and then slaughtered at about 106 kg body weight (BW). At slaughter, significantly older were gilts A than gilts B (371.03 *vs*. 179.64 days). BW at slaughter was 153.50 kg in group A and 106.77 kg in group B (P≤0.01). Lean content of carcass reached 53.36% in A and 54.77% in B group. Highly significant differences were found in backfat thickness over last rib (1.21 cm in A and 1.87 cm in B gilts), and over sacrum II (1.34 cm in A *vs* 1.73 cm in B gilts). Significant differences for mean from five backfat measurements were identified between the groups: 2.01 cm in A *vs*. 2.36 cm in B group. Comparative analysis showed higher weight of ham (13.88 *vs*. 9.45 kg), and slightly lower meat content of ham (68.13% *vs*. 70.79%), respectively, in A and B gilts (P<0.01). The results obtained showed that first farrowing gilts did not differ in slaughter traits from standard gilt fatteners. Their certain carcass indicators seem to be even higher.

KEY WORDS: carcass / fattener gilts / once-bred gilts / gilts / slaughter value

The efficiency of pig production constitutes the most important element ensuring constant production development and quality progress. It should, therefore, encompass an appropriate income earned by the producer and comply with all applicable requirements and expectations of the meat buyer, *i.e*. the ultimate consumer. One of the methods for increasing pig production efficiency and lowering related costs may

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**Corresponding author: kapelanski@utp.edu.pl

be to slaughter the gilts after they have reared the first litter. In this way, it is possible to obtain slaughter material and piglets for breeding at the same time. The production of this particular type of slaughter material, although not new [Alexandrowicz *et al*. 1954, Kotarbińska and Kielanowski 1973, Brooks and Smith 1977, Mac Pherson *et al*. 1977], nowadays calls for modern solutions. These concern mainly the process of obtaining the early maturing gilts distinguished by high slaughter value and prime quality of meat. The high slaughter value of first farrowing gilts comprises of high meat and low fat content of carcass [Kapelańska *et al*. 2002, Daszkiewicz *et al*. 2005, Kapelański *et al*. 2005, 2007]. The purpose of the present investigation was to compare the indicators of slaughter value in gilts after they have reared the first litter with the gilts fattened as per standard procedures.

Material and methods

Under conditions typical for a Polish pedigree pig breeding farm, 73 F_1 Polish Landrace × Polish Large White crossbred littermate gilts were taken from twenty litters and divided into two groups (A and B). Group A were gilts slaughtered after their first farrowing, while group B were their littermates undergoing regular (traditional) fattening process.

Gilts A were fed a standard diet, according to Polish standards and recommendations for this particular group of animals [Feeding Standards for Pigs 1993]. From day 142 of life and for a period of 21 days, special diet was applied, *i.e*. a diet enriched with maize starch and 60g of glucose, designed by Brand *et al*. [1998]. The diet was given in two meals, 2.5 kg / meal. From day 150 of life, the gilts of group A were allowed twice a day a direct 20 min contact with an adult boar to stimulate their sexual maturation. Moreover, the gilts remained under strict scrutiny (observed twice a day – at 11 am and 7 pm) with regard to oestrus occurrence, the intensity of which was measured according to the scale developed by Karalus *et al*. [1990]. In due time upon identifying the first oestrus, a double natural mating took place. The gilts suckled their new-born litters until day 28 and subsequently, no sooner however than 10 days from weaning, the gilts were transported to the Meat Processing Plant in Bydgoszcz, and slaughtered.

The fattening of B gilts started at the age of approximately three months and a BW of 30 kg, and was completed upon reaching a BW of about 106 kg. Ten gilt fatteners were kept together in one pen (1.2 m^2 for gilt) and fed the wet feed from troughs [Feeding Standards for Pigs 1993].

To assess the slaughter value and carcass quality of gilts of both groups the warm dressing percentage, carcass length and backfat thickness were established Additionally, the loin eye area was measured by means of computer-aided image analysis – LUCIA, and the lean content of carcass estimated with the ULTRA FOM-100 stationary device. The tissue composition of ham was also determined by dissecting. Cutting of the carcasses was done in accordance with applicable meat

industry procedures [Polish Standard 1986]. Results were processed statistically. Significance of differences between the two groups was estimated with the Duncan test and t-test, aided by the STATISTICA 8 PL [2008] computer software.

Results and discussion

Important slaughter performance indicators are presented in Table 1. The studied groups of animals differed in terms of age and BW at slaughter. The first farrowing gilts (group A) were significantly older than those coming from traditional fattening (371.03 days and 179.64 days, respectively). At the same time, A animals showed a higher slaughter BW than animals B (153.50 kg *vs*. 106.77 kg; P≤0.01) and higher carcass weight (123.10 kg *vs*. 85.07 kg; P≤0.01). Slightly lower values were reported by Kapelańska *et al*. [2000] and Kapelański *et al*. [2004].

Table 1. Some important carcass characteristics

Trait	Group	
	A First farrowing gilts	B Standard fattened gilts
Number (n)	34	39
Age at slaughter (days)	371.03^{A}±20.29	179.64^{B}±10.26
Body weight at slaughter (kg)	153.50^{A}±18.03	106.77^{B}±6.57
Hot carcass weight (kg)	123.10^{A}±15.85	85.07^{B}±6.02
Dressing percentage	80.15±2.67	79.65±1.66
Carcass length (cm)	97.57^{A}±4.60	84.23^{B}±2.73
Loin eye area (cm^2)	54.99±11.29	51.43±6.82
Lean content of carcass (ULTRA-Fom, %)	53.36±4.18	54.77±5.14

^{AB}P≤0.01.

The relatively high warm dressing percentage (80.15 % for group A and 79.65% for group B) is worth pointing out, as it has been preliminarily estimated that the influence of reproduction organs on the first farrowing gilts' body weight might have caused a considerable decrease in dressing percentage. This particular possibility was indicated by Fandrejewski and Raj [1997], who showed that first farrowing as well as multiparous sows, compared to controls fattened up to the same body weight, reached lower dressing percentage. Similar values in terms of trait in question were reported by Kapelańska *et al*. 2002, Kapelański and Grajewska 2005 and Kapelański *et al*. 2007]. It has furthermore been stated (Tab. 1) that considerably heavier and longer carcasses of the first farrowing gilts (97.57 cm; P≤0.01) were characterized by good muscling and lower fat content, as compared to the carcasses of gilts fattened according to standard procedure (84.23 cm; P≤0.01).

The carcass tissue composition changes as the animals grow older [Chwalibog *et al*. 1997]. Daily protein deposition in pigs is beginning to fall with the animal reaching

a higher age, at which the period of fat deposition begins to dominate [Kotarbińska 1969]. This is most typical in fatteners with a longer fattening period and a high body weight upon slaughter [Larzul *et al*. 1997, Beattie *et al*. 1999]. In the case of gilts slaughtered after they have farrowed, the crucial factor which may affect the features of their carcasses related to muscling and fattness, may be the number of piglets born and suckled by the sow, as it is strictly related to energy expenditure for milk production during lactation. The amount of energy and nutrients necessary to suckle the piglets usually exceeds the amount that sows can obtain from the feed, and therefore a loss in body weight, mainly fat, takes place [Bocian *et al*. 2007]. In the course of this study, the muscling of both groups was on a similar level, amounting from 54.77% (group B) to 53.36% (group A) – Table 1.

The most lean-muscled carcass cuts remain to be seen as particularly valuable elements. These are: ham, loin, shoulder and neck. In the present study, a tissue composition analysis has been carried out with regard to the ham (Tab. 2). Mean weight of ham in A gilts was over 4 kg higher than of ham obtained from standard fatteners ($P \leq 0.01$). However, the meat content of ham turned out to be slightly higher in the gilts fattened by standard procedure (group B) – 70.79% *vs*. 68.13%; $P \leq 0.01$). This result relates to the higher fattness of ham in case of older animals (first farrowing gilts). The intermuscular fat and external fat weights were both highly significantly higher in group A (0.47 kg and 2.16 kg, respectively), than in group B (0.18 kg and 1.39 kg, respectively). These results indicate the hams' high value in terms of canned and quality meat products production and highly acclaimed flavour properties, owing to appropriate weight and good muscling.

Table 2. Weight and tissue composition of ham

Trait	Group	
	A First farrowing gilts	B Standard fattened gilts
Weight of ham (kg)	13.88^{A}±2.25	9.46^{B}±0.79
Meat of ham		
(kg)	9.45^{A}±1.56	6.69^{B}±0.61
(%)	68.13^{A}±3.74	70.79^{B}±4.25
Skin		
(kg)	0.75^{A}±0.19	0.50^{B} ± 0.08
(%)	5.41±0.93	5.28±0.78
External fat		
(kg)	2.16^{A}±0.71	1.39^{B}±0.46
(%)	15.38±3.59	14.57±4.39
Intermuscular fat		
(kg)	0.47^{A}±0.10	0.18^{B}±0.06
(%)	3.38^{A}±0.65	1.86^{B}±0.69
Bone		
(kg)	1.05^{A}±0.21	0.71^{B}±0.07
(%)	7.71±1.85	7.50±0.56

$^{AB}P \leq 0.01$.

Table 3 presents the results of linear measurements of backfat. Highly significant differences were found in two points: on the back and over the second sacral vertebra. In both cases the thinner backfat occurred in the first farrowing gilts' carcasses (1.21 cm and 1.34 cm, respectively) as compared to the standard fattened gilts (1.87 cm and 1.73 cm, respectively). Furthermore, mean backfat thickness from the five measurements was significantly lower in A than in B gilts (2.01 *vs*. 2.36 cm). Comparable results from a study on gilts upon their first farrowing were reported by Kapelański *et al*. [2004, 2007].

Table 3. Linear measurements of backfat along the carcass side over the backbone

Trait	Group	
	A First farrowing gilts	B Standard fattened gilts
Backfat thickness (cm)		
over shoulder	3.25±0.94	3.55±0.59
on the back over the last rib	1.21A±0.80	1.87B±0.44
on sacrum I	2.17±0.85	2.32±0.64
on sacrum II	1.34A±0.58	1.73B±0.54
on sacrum III	2.05±0.72	2.28±0.68
Mean backfat thickness (cm)	2.01a±0.68	2.36b±0.51

$^{AB}P\leq0.01$; $^{ab}P\leq0.05$.

Based on the results presented here it may be stated that the first farrowing gilts did not differ in terms of slaughter value from those fattened according to standard fattening procedures. In case of some parametres, the former have even produced better results. The meat content of carcass was considerably high and similar in both groups. In terms of the weight of the ham and the thickness of backfat, the first farrowing gilts' carcasses were distinguished by more advantageous values.

REFERENCES

1. ALEXANDROWICZ S., BENEDYKCIŃSKI S., KRAUZE W., 1954 – Production of baby pigs from primiparous sows slaughtered at first litter. ***Roczniki Nauk Rolniczych*** 68-B, 283-296.
2. BEATTIE V.E., WEATHERUP R.N., MOSS B.W., WALKER N., 1999 – The effect of increasing carcass weight of finishing boars and gilts on joint composition and meat quality. ***Meat Science*** 52, 205-211.
3. BOCIAN M., GRAJEWSKA S., JELIŃSKA A., JANKOWIAK H., JACOSZEK D., 2007 – Carcass slaughter value of the first farrowing gilts in relation to number of weaned piglets. In Polish, summary in English. LXXII Meeting of the Polish Society of Animal Production. "Nadzieje i możliwości wykorzystania genetyki molekularnej w doskonaleniu zwierząt". Warszawa, 11-14 September.
4. BRAND H., VAN DEN SOEDE N.M., SCHRAMA J.W., KEMP B., 1998 – Effects of dietary energy source on plasma glucose and insulin concentration in gilts. ***Animal Physiology and Animal Nutrition*** 79, 27-32.
5. BROOKS P.H., SMITH D.A., 1977 – Meat production from pigs which have farrowed. 3. The effect of weaning-to-slaughter interval on food utilization and carcass quality. ***Animal Prododuction*** 25, 247-254.

6. CHWALIBOG A., TAUSON A.H., THORBEK G., 1997 – Protein retention in growing boars of different breeds, and estimation of maximum protein retention. Materiały Konferencji Naukowej nt. Współczesne zasady żywienia świń (2). PAN, Jabłonna 3-4 czerwca 1997.
7. DASZKIEWICZ T., WAJDA S., KAPELAŃSKI W., 2005 – Comparison of the quality of meat from gilts and primiparous sows. (In Polish). ***Żywność. Nauka. Technologia. Jakość.*** 3 (44), 21-27.
8. FANDREJEWSKI H., RAJ S., 1997 – Carcass composition of sows. (In Polish) Polsko-Słowacko-Czeska Konferencja Naukowa nt. Aktualne problemy w produkcji trzody chlewnej. Olsztyn 1997, 83.
9. Feeding Standards for Pigs. Institute of Animal Physiology and Nutrition of the Polish Academy of Sciences. Jablonna, 1993.
10. KAPELAŃSKA J., DYLAS R., KAPELAŃSKI W., DYBAŁA J., RAK B., GRAJEWSKA S., 2002 – Slaughter value and meat quality of primiparous gilts. ***Annals of Animal Science,*** Suppl., No. 2, 297-300.
11. KAPELAŃSKI W., DYBAŁA J., KAPELAŃSKA J., BOCIAN M., BIEGNIEWSKA M., 2004 – Slaughter value of first farrowing sows, early mated and stimulated for sexual maturity. ***Proceedings of the British Society of Animal Science,*** International Conference, Krakow-Poland, 14-15 October, p.42.
12. KAPELAŃSKI W., GRAJEWSKA S., 2005 – The issue of slaughter utilisation of the first farrowing sows. In Polish. ***Żywność. Nauka. Technologia. Jakość.*** 3 (44), 65-77.
13. KAPELAŃSKI W., GRAJEWSKA S., BOCIAN M., KAPELAŃSKA J., 2007 – Slaughter indicators and carcass traits as related to changes in body weight during lactation and post-weaning priod of primiparous sows. ***Animal Science Papers and Reports*** 25 (4), 231-239.
14. KARALUS U., DOWNEY R.R., AINSWORTH L., 1990 – Maintenance of ovulatory cycles and pregnancy in prepubertal gilts treated with PMSG and hCG. ***Animal Reproduction Science*** 22, 235-241.
15. KOTARBIŃSKA M., 1969 – Badania nad przemianą energii u rosnących świń (Investigations on energy metabolism in growing pigs). Rozprawa habilitacyjna (Thesis). In Polish, summary in English. Wrocław, 1-67.
16. KOTARBIŃSKA M., KIELANOWSKI J., 1973 – A note on meat production from pigs slaughtered after first weaning a litter. ***Animal Production*** 17 (3), 317-320.
17. LARZUL C., LEROY P., TALMANT A., GOGUE J., SELLIER P., MONIN G., 1997 – Effect of halothane genotype (NN, Nn, nn) on growth, carcass and meat quality traits of pigs slaughtered at 95 kg or 125 kg live weight. ***Journal of Animal Breeding and Genetics*** 144 (4), 309-320.
18. MAC PHERSON R.M., DEB HOVELL T.D., JONES A.S., 1977 – Performance of sows first mated at puperty or second or third oestrus, and carcass assessment of once-bred gilts. ***Animal Production*** 24, 333-342.
19. Polish Standard (PN-86/A-82002-1)., 1986 – Pork. Primary cuts.
20. STATISTICA 8 PL (2008).
21. WAJDA S., DASZKIEWICZ T., KAPELAŃSKI W., PUCHALSKA D., 2005 – The slaughter value of carcasses from gilts and primiparous sows. In Polish. ***Żywność. Nauka. Technologia. Jakość.*** 3 (44), 206-211.

Wojciech Kapelański, Milena Biegniewska

Wartość rzeźna loszek po odchowaniu pierwszego miotu i loszek tuczonych standardowo

S t r e s z c z e n i e

Badaniami objęto 73 loszki mieszańce F_1 ras polskiej białej zwisłouchej i wielkiej białej polskiej, które podzielono na dwie grupy (A i B). Grupę A stanowiły 34 loszki poddane ubojowi po odchowaniu pierwszego miotu („jednorazówki"), natomiast grupę B – 39 loszek tuczonych standardowo i ubijanych przy masie ciała około 106 kg. Loszki obu grup pochodziły z tych samych miotów i były siostrami. Celem przeprowadzonych badań było porównanie loszek grupy A z grupą B pod względem wartości rzeźnej. W dniu uboju badane grupy zwierząt różniły się średnim wiekiem i masą ciała. Istotnie starsze były loszki A („jednorazówki"), których wiek był dwukrotnie większy niż loszek pochodzących z tuczu tradycyjnego (odpowiednio 371,03 dni i 179,64 dni; $P \leq 0,01$). Jednocześnie zwierzęta grupy A cechowała wyższa masa ciała przed ubojem (153,50 kg grupa A oraz 106,77 kg grupa B; $P \leq 0,01$). Mięsność obu grup kształtowała się na zbliżonym poziomie – od 54,77% (grupa B) do 53,36% (grupa A). Wykazano wysoce istotne różnice w zakresie grubości słoniny grzbietowej mierzonej na grzbiecie i na wysokości II kręgu krzyżowego. W obu przypadkach cieńszą słoniną cechowały się tusze loszek grupy A (odpowiednio 1,21 i 1,34 cm) wobec loszek z tuczu standardowego (1,87 i 1,73 cm). Dysekcja szczegółowa szynki właściwej wykazała wyższą masę tego wyrębu, ale nieco niższy udział w nim mięsa w przypadku jednorazówek (13,88 wobec 9,46 kg i 68,13 wobec 70,79%; $P \leq 0,01$). Na podstawie uzyskanych wyników można twierdzić, że loszki jednorazówki nie odbiegały pod względem cech rzeźnych od loszek tuczonych tradycyjnie, a w przypadku niektórych parametrów nawet je przewyższały.