

RESULTS OF MEAT QUALITY AND TECHNOLOGICAL SUITABILITY ASSESSMENT OF FATTENERS OBTAINED FROM MATING NAIMA SOWS WITH P-76 BOARS*

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Investigations were carried out on 97 samples of *musculus longissimus dorsi* cut out from carcasses of commercial fatteners 24 h after slaughter. The control group consisted of wbp pure-bred fatteners, whereas the experimental group comprised hybrids obtained from crossing Naima sows with P-76 boars. No carcasses with quality defects of DFD or ASE type were recorded in either of the examined groups, while the proportion of PSE meat in the experimental group amounted only to *ca.* 1.5%. Favourable results of physicochemical and technological examinations as well as of sensory evaluation of meat and smoked loin indicate that the examined hybrids can be treated as good raw material for the production of both culinary meat and for processing.

INTRODUCTION

Significant research efforts have been undertaken recently by pig breeders and producers as well as by the meat industry with the aim to increase carcass meat and, simultaneously, to maintain its good quality [Koćwin-Podsiadła, 1998; Borzuta *et al.*, 2002].

Investigations have indicated that increased fattener meatiness, in certain circumstances, may be associated with a deterioration of quality characteristics of meat intended for culinary and processing needs [Koćwin-Podsiadła, 1998]. It is also believed that high-quality products manufactured from pigs with high meat content are characterised by inferior sensory properties [Brandt, 1997].

The objective of this study was to determine the quality and processing suitability of meat obtained from fatteners derived from crossing Naima sows with P-76 boars.

MATERIAL AND METHODS

Investigations were carried out on 30 pure-bred wbp fatteners (control group) and 67 hybrids obtained by crossing Naima sows with P-76 boars. The following measurements and assays were performed in *longissimus dorsi* (LD) muscles: pH 45 min and 24 h after slaughter, electrical conductivity (EC) 24 h after slaughter; contents of: water, fat [PN-73/A-82111] and protein [PN-75/A-04018], water holding capacity (using Grau and Hamm [1952] method modified by Pohija and Niinivaara [1997], meat colour (measurements of $L^*a^*b^*$ using a Minolta CR-300 apparatus as well as by means of a subjective assessment using IPMiT models of 1–4 scores), marbling (according to IPMiT models of 1–4 scores), cold drip after 48 h storage at a temperature of 4°C, and weight loss during cooking of meat.

Smoked loin was prepared using a traditional technology, *i.e.* one without functional additives and muscle massaging [Technological Manual, 1986]. Increments of muscle weight and technological yield of the finished product were determined in relation to the fresh raw material.

Sensory evaluation of the cooked meat was carried out according to a 5-point scale. Meat sample tenderness was also determined by means of a Warner-Bratzler apparatus. The obtained results were processed statistically. Means between the examined groups were compared with Tukey's test [Stanisz, 1998].

RESULTS

Table 1 presents characteristics of selected meat quality traits. No carcasses with PSE or DFD type of meat were found in the control group, whereas in the experimental group, there was only one carcass with exudative meat ($pH_1 < 5.8$).

In comparison with the control group, the experimental fatteners were characterised by a higher meat juice drip, and thus worse water binding capacity (3.54% and 4.65%; 33.71% and 34.94% respectively) as well as by a greater weight loss during meat cooking (26.12% and 29.24%, respectively). The basic chemical composition and the results of colour estimation are shown in Table 1. The content of intramuscular fat in muscles of the control group was at the level of 3.36%, while in the experimental group it was significantly lower and amounted to 2.43%.

In comparison with the control group, meat colour of the experimental fatteners was characterised by lighter shade ($L = 49.51$ and 46.85).

The results of sensory estimation of cooked meat are characterised in Table 2. Meat palatability of fatteners from the control group obtained higher scores (4.42 points) in

TABLE 1. Meat quality characteristics of the investigated fatteners.

Traits	Control group	Experimental group
pH ₁	6.52±0.33	6.49±0.24
pH ₂	5.64±0.11	5.65±0.06
Water holding capacity (%)	33.71±2.03 ^A	34.94±2.43 ^B
Drip losses (%)	3.54±0.58 ^A	4.65±0.64 ^B
Cooking losses (%)	26.12±3.24 ^A	29.24±4.08 ^B
Share of carcasses with PSE meat (%)	0	1.49
Share of carcasses with acid meat (%)	0	0
Share of carcasses with DFD meat (%)	0	0
Water content (%)	72.66±0.85 ^A	74.54±0.64 ^B
Fat content (%)	3.36±0.83 ^A	2.43±0.51 ^B
Total protein content (%)	22.98±0.32 ^a	22.03±0.34 ^b
Colour:		
L	46.85±2.87 ^A	49.51±1.57 ^B
a	6.11±1.02	6.29±0.83
b	3.10±1.01	3.26±0.94
Colour, points	2.64±0.56 ^A	2.32±0.55 ^B
Marbling, points	1.80±0.59 ^a	1.51±0.48 ^b

A, B – significant at $p < 0.01$; a, b – significant at $p < 0.05$

TABLE 2. Parameters of cooked and smoked loin.

Traits	Control group	Experimental group
Cooked loin		
Flavor	4.50±0.11 ^A	4.05±0.39 ^B
Juiciness	4.00±0.50	3.88±0.43
Tenderness	4.15±0.35	3.99±0.39
Palatability	4.42±0.25 ^A	3.96±0.27 ^B
Shear force WB (N)	73.13±15.19 ^A	55.98±12.54 ^B
Colour:		
L	69.59±1.72 ^A	74.80±1.22 ^B
a	8.89±1.13	9.52±0.81
b	6.90±0.48	4.07±0.75
Smoked loin		
Colour:		
L	44.30±2.90 ^A	52.02±3.35 ^B
a	6.45±0.84	7.88±0.87
b	3.32±0.79	3.75±0.67
Shear force WB(N)	60.78±12.82 ^a	53.53±12.55 ^b
Increase of weight during pickling (%)	9.89±1.57 ^A	8.12±0.86 ^B
Yield of finished product (%)	90.32±1.32 ^a	87.94±1.26 ^b

A, B – significant at $p < 0.01$; a, b – significant at $p < 0.05$.

comparison with the experimental group (3.96 points). On the other hand, meat tenderness estimated using the Warner-Bratzler apparatus was higher in the meat of the experimental fatteners than in the control group (55.98 N and 73.12 N, respectively). However, this result was not confirmed by sensory assessment.

Table 2 presents technological traits of smoked loin. In comparison with the control group, smoked loin manufactured from muscles of the experimental group was characterised by a lower technological yield and lighter colour, although its tenderness determined using the Warner-Bratzler apparatus was better.

DISCUSSION

Fresh meat quality analysis of the examined genetic

groups of pigs did not reveal any quality deviation of PSE and DFD type in pure-bred wbp fatteners. With regard to the experimental group, there was only one case of PSE meat, which constituted merely 1.5% of the population. In addition, on the basis of the pH₂ value determined in both groups, no carcasses with acid meat with pH₂<5.8 were identified [Koćwin-Podsiadła *et al.*, 1998]. It is evident from the information materials of the PEN AR LAN Company that P-76 boars have no RYR1 and RN genes. The above-mentioned genes are responsible for watery and acid meat.

Meat from fatteners obtained by mating Naima sows with P-76 boars was characterised by a significantly higher drip from fresh muscle tissue (by about 1.2%) and after cooking (by about 3.12%). Moreover, in comparison with pure-bred fatteners, meat from the experimental animals was characterised by a less favourable water binding capacity. It should be stressed, however, that in comparison with the meat of fatteners from other high-meat content genotypes, *e.g.* crosses with Hampshire or Pietrain breeds, the drip recorded in the experimental animals was considerably smaller (4.54% vs. 6.5 to 8%) [Lundstrom *et al.*, 1994; Grześkowiak, 1999].

Eikelenboom [1996] claims that with an increase in carcass meatiness the content of intramuscular fat in the meat tissue also drops. The results of this study confirm that the experimental fatteners, which showed better musculature, were characterised by 0.93% lower content of intramuscular fat in comparison with the wbp fatteners. According to Wood *et al.* [1994], in order to maintain desirable palatability, the optimal content of intramuscular fat in meat should range from 2 to 3%. Hence, the obtained mean fat level of 2.43% was within the optimal interval. However, poorer intramuscular fat content observed in animals from the experimental group could have been responsible for its worse results of palatability assessment. On the other hand, measurements carried out with the Warner-Bratzler apparatus showed a significantly higher tenderness of both cooked meat and smoked loin obtained from the experimental animals than from meat from the control group.

Meat of animals from the control group was found to gain by 1.7% more weight during the process of pickling. However, these gains were on a similar level as in hybrids of white breeds with Hampshire x Duroc boars and even by over 1.5% higher in comparison with fatteners with 50% share of Hampshire breed [Grześkowiak, 1999]. The smaller gains of muscle weights of experimental fatteners, in comparison with the control group, were responsible for about 2.4% lower yields of smoked loin in that group.

CONCLUSIONS

Summing up, it can be concluded that the meat of fatteners obtained by mating Naima sows with P-76 boars was characterised by good quality. However, in comparison with the pure-bred animals, it showed a higher meat juice drip during storage and thermal processing and this resulted in a worse technological yield of smoked loin. Nevertheless, meat of Naima x P-76 fatteners exhibited a significantly better tenderness of cooked meat and smoked loin than that of pure-bred animals and, therefore, it can be considered to be a good raw material for the production of meat for culinary purposes and processing.

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WYNIKI OCENY JAKOŚCI I PRZYDATNOŚCI TECHNOLOGICZNEJ MIĘSA TUCZNIKÓW UZYSKANYCH Z KOJARZENIA LOCH NAIMA Z KNURAMI P-76

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Badania przeprowadzono na 97 próbach mięśnia najdłuższego grzbietu, wyciętych z tusz tuczników towarowych po 24 h od uboju. Grupę kontrolną stanowiły tuczniaki czystorasowe wbp, natomiast doświadczalną mieszańce pochodzące z kojarzenia loch Naima z knurami P-76. W obu badanych grupach nie stwierdzono tusz z odchyleniami jakościowymi typu DFD i ASE, natomiast udział mięsa PSE w grupie doświadczalnej wynosił tylko ok. 1,5%. Korzystne wyniki badań fizykochemicznych, technologicznych oraz oceny sensorycznej mięsa i polędwicy wędzonej surowej wskazują, że badane hybrydy są dobrym surowcem zarówno do produkcji mięsa kulinarnego jak i do przetwórstwa.

