**PE1.73 Effect of the three different Penarlan boar lines on the slaughter value of fatteners 446.00**

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**Abstract - Investigations were carried out on 120 fatteners, which were divided into 4 experimental groups of which each was represented by another genotype of sire, i.e. Solbeck, Neckar, P-76 and Duroc (the control). All fatteners of both sexes ( 1:1 ) was breed in the same producer group in the same environmental conditions. Pigs were slaughtered at 115kg by electrical stunning of KOMA device. On warm, left carcasses meatiness was measured by CGM device, as well as $pH_{45}$ measurement and backfat thickness at 5 different points. At 24 hours post-mortem on the cold, left carcasses electrical conductivity was measured by MT-03 device and score of marbling was evaluated. The carcasses were cuted into the primal cuts. The comparison of animals from experimental groups with those from control Duroc group revealed that animals derived from Penarlan boar lines had more meat in carcass, in particular Solbeck line (meatiness in this group was 58,40%, and in the control group 56,12%). Fatteners from this group had also thinner back fat measured in 5 different carcass points. The average $pH_{45}$ value was about 6,5 in all groups and the amount of PSE meat was low (max. 6% in Solbeck group). In comparison with control Duroc group, the yield of carcass cuts with higher market value, ( i.e. ham, shoulder, loin and neck ) was in experimental groups approximately higher.**

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**Keywords: PenArLan, boars, slaughter value, meat quality**

## I. INTRODUCTION

In recent years a considerable improvement has been observed in Poland in terms of slaughter value of the pig population. Improvement of slaughter material has been enforced as a result of increasing requirements of consumers. This has been the result to the highest degree of efforts of breeders and producers, directed towards genetic improvement and optimization of feeding in pigs as well as modernization of animal production and fattening regimes, aiming at enhanced leanness and improved slaughter values of pigs. This progress has led to the creation of lines of animals with specialized production traits, free from certain undesirable inherited traits. The introduction of hybrid pigs on the national market has had an advantageous effect on the condition of mass population in Poland [4].

Among several hybrid lines kept in Poland PenArLan pigs have become increasingly popular. This is manifested in the growing proportion of these animals in the Polish resources of slaughter material. It results from available information that PenArLan fatteners are characterized by high leanness and a low percentage of quality defects. Studies conducted so far are based mainly on the observation of pig populations formed from the mating of a hyperprolific Naima sow with a P76 boar. Hybrid PenArLan boars P76 have been found on the Polish market for many years now. Recently other boars of the newest paternal lines Solbeck and Neckar have been imported from France to Poland, which offspring are characterized by a high growth rate and high leanness, and being practically free from quality defects.. To date there have been no reports in Polish literature on studies concerning slaughter value of offspring after the above mentioned newest paternal PenArLan lines.

The aim of the study was to conduct a comparative analysis of slaughter value and meat quality of fatteners coming from mating sows of the Naima hybrid line and boars of three paternal lines, i.e. P-76, Neckar and Solbeck, as well as to make an attempt and explain what production, slaughter and quality effects may be expected from fatteners produced as a result of reproduction of the above mentioned hybrid lines.

## II. MATERIAL AND METHODS

Analyses were conducted on 120 carcasses of fatteners divided into 4 groups, of which each was represented by another genotype of the sire, i.e. Solbeck, Neckar, P-76 (experimental groups) and Duroc (the control). As it is reported by the creator of the line, selection of hybrid PenArLan boars was directed at the maximum muscling of animals and elimination of the stress susceptibility gene and the acidity gene $RN^-$. In each group a Naima sow was the dam. All fatteners were produced in the

producers' group, by maintaining similar management conditions and an identical feeding regime with all-mash, coming from one feed producing plant. Fatteners, both gilts and boar piglets at a 1:1 ratio, after reaching weight of approx. 115 kg were transported to an abattoir (transport at a distance of approx. 30 km) and slaughtered using an electric stunner KOMA after 1 - 2h rest. At the slaughter line on warm hanging, left half-carcasses the following measurements and determinations were made: meatiness with an optic needle device CGM, carcass weight at accurate to 100g, measurement of $pH_{45}$ in the lumbar section of the *longissimus dorsi* muscle (LD) using a ph-meter by SYDEL with a stiletto electrode, and a measurement of backfat thickness using a slide caliper in 5 points, i.e. at the sacrum points I, II, III, the back and shoulder. On left half-carcasses after 24h cooling in the *longissimus dorsi* muscle at a height of 1 - 2 lumbar vertebra electrical conductivity (EC) was measured using a conductometer MT-03. Moreover, marbling of *m. gluteus medius* was evaluated following the standards in a scale of 1 - 4 points [7]. Next left half-carcasses were subjected to primal cutting according to the adopted industrial practice standard. Weight of primal cuts was measured using an electronic scale accurate to 5g. Percentages of primal cuts were calculated in relation to the weight of the cooled half-carcass.

Collected results of measurements were subjected to statistical analysis. Statistical significance of the effect of analyzed experimental factors on investigated traits of slaughter values was determined using the analysis of variance. The Tukey test was applied to compare means.

*a. Results*

Results of comparative analyses of slaughter value and meat quality of fatteners are listed in Tables 1 - 2. As it was shown in the conducted statistical analysis, a significant effect of PenArLan boars was observed on certain traits of offspring. On the basis of results in terms of analyzed carcass parameters in different genetic groups of fatteners it was stated that carcasses of all these groups were characterized by a similar slaughter yield, amounting to approx. 78%, and a similar slaughter weight. The most advantageous results were recorded in the group, in which the sire was a boar of the Solbeck line. Fatteners in this group were characterized by the highest meatiness (58.4%), the thinnest backfat and good marbling of *m. gluteus medius*, in comparison to the other groups (statistically significant differences), as well as a slight (approx. 6%) proportion of carcasses with a quality defect such as e.g. PSE. Based on results of measured $pH_{45}$ and electrical conductivity at 24 h after slaughter it may be stated that in all analyzed groups carcasses with quality defects such as e.g. PSE constituted a slight percentage or the defect was not recorded at all. In the experimental groups a higher percentage of total four primal cuts was found in the carcass than in the group in which the sire was a Duroc boar (tab. 2).

*b. Discussion*

The study confirmed an advantageous effect of hybrid Penarlan boars on slaughter value and meat quality of fatteners. Recorded results confirmed also studies conducted by other authors, however, based primarily on observations on the pig population produced from mating a hyperprolific Naima sow with a P76 boar [7]. The authors stated that fatteners coming after P76 boars reached meatiness of 54.82% and 54.6%. In this study mean meatiness of fatteners sired by a P76 boar was approx. 55.88% (tab. 1). As it was reported by Niemyjski [11], mean meatiness of pure P76 lines in pedigree herds in 2003 was 63%.

A commonly known fact is the adverse dependence between an increase in meatiness of fatteners and a deterioration of meat quality caused by the occurrence of quality defects. Thus for many years studies have been conducted aiming at the selection of such pig lines, which offspring were free from disadvantageous genes. Two new lines of boars named Neckar and Solbeck were introduced in order to further improve muscling of animals, increase meatiness and eliminate the undesirable stress susceptibility gene [11]. It was shown in this study that the most advantageous traits of slaughter value were found for offspring sired by a boar of the Solbeck line, which is manifested in its highest meatiness and thinnest backfat as well as a high mean $pH_{45}$. As it

is reported by the creator of this line, fatteners coming after boars of the newest lines are characterized by high meatiness and are free from quality defects [11]. In studies conducted by other authors [7] crosses of a Naima sow with a P76 boar produced meat completely free from quality defects. Analyses conduced in this study only partly confirmed these opinions, since the absence of PSE

meat was found only in offspring sired by a Neckar boar or by Duroc boars. In the group of Solbeck and P76 quality defects were found at a very low percentage (with approx. 6% each, of which extremely PSE meat was recorded at 3% in P76 and it was not found in the Solbeck group).

Carcasses of hybrid fatteners with a higher meatiness were also characterized by a share of primal cuts, i.e. loin, ham, shoulder and neck, higher by approx. 1 to 6% in relation to the control.

## III. CONCLUDING REMARKS

Among analyzed four genetic groups fatteners coming from crossing of Naima sows with a boar of the Solbeck hybrid line exhibited the most advantageous parameters from the point of view of slaughter pig producers, i.e. high meatiness and thin backfat. Fatteners of all analyzed hybrid lines were also characterized by a more advantageous proportion of primal cuts (neck, loin, ham and shoulder) in relation to the group of fatteners, sired by a Duroc boar. A small proportion, amounting to several percent, of carcasses with PSE meat with pH < 6.0 was recorded in the groups of carcasses of fatteners sired by Solbeck and P76 boars. Nobody carcasses with extremly PSE meat (pH<5,8) was stated in two experimental groups (Solbeck and Neckar).

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*Table 1. Results of slaughter value and carcass quality of investigated groups.*

| Trait | Statistical measure | Group | | | |
|---|---|---|---|---|---|
| | | Neckar | Solbeck | P76 | Duroc |
| Weight of carcass, kg | x | 97,2 | 95,9 | 93,6 | 98,8 |
| | s | 7,77 | 7,18 | 10,46 | 8,42 |
| Meat content in carcass, % | x | 56,39 | 58,40[A] | 55,88 | 55,01 |
| | s | 3,17 | 1,77 | 2,67 | 3,38 |
| Fat thickness, mm: | | | | | |
| • cross KIII | x | 21,67 | 16,56 | 17,76 | 27,03 |
| | s | 5,61 | 5,64 | 5,02 | 7,77 |
| • cross KII | x | 16,90 | 12,93[A] | 15,53 | 17,66 |
| | s | 5,24 | 2,98 | 3,59 | 6,51 |
| • cross KI | x | 23,39 | 19,20[A] | 21,17 | 27,66 |
| | s | 5,07 | 5,86 | 4,89 | 6,51 |
| • Back | x | 24,61 | 21,47 | 22,43 | 24,61 |
| | s | 5,31 | 4,16 | 5,36 | 5,60 |
| • Shoulder | x | 39,39 | 34,43 | 35,23 | 40,41 |
| | s | 5,68 | 4,85 | 6,72 | 7,32 |
| Marbling, points | x | 1,5 | 2,3[A] | 1,47 | 1,55 |
| | s | 0,44 | 0,85 | 0,48 | 0,48 |
| Carcass yield, % | x | 78,23 | 78,83 | 78,15 | 78,05 |
| | s | 0,002 | 0,001 | 0,001 | 0,001 |
| $PH_{45}$ | x | 6,52 | 6,50 | 6,45 | 6,59 |
| | s | 0,26 | 0,24 | 0,28 | 0,22 |
| $EC_{24}$, mS | x | 4,42 | 5,01 | 3,44 | 3,46 |
| | s | 2,35 | 2,52 | 1,60 | 1,40 |

A- means with this index are statistically different (p<0,01)

*i.*

*ii. Table 2. Results of cutting of investigated carcass groups*

| Primal cuts | Statistical measure | Genetic group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Neckar | | Solbeck | | P76 | | Duroc | |
| | | weight, kg | % in carcass | weight, kg | % in carcass | weight, kg | % in carcass | weight, kg | % in carcass |
| Neck | x | 3,42 | 7,14 | 3,68 | 7,67 | 3,23 | 7,09 | 3,51 | 5,65 |
| | s | 0,28 | 0,86 | 0,35 | 0,52 | 0,28 | 0,69 | 0,39 | 0,63 |
| Loin | x | 4,86 | 10,07 | 5,06 | 10,55 | 3,22 | 9,49 | 4,87 | 8,20 |
| | s | 0,59 | 1,24 | 0,49 | 0,74 | 0,25 | 0,68 | 0,39 | 1,06 |
| Ham with shank | x | 13,03 | 26,9 | 11,37 | 23,73 | 12,03 | 26,22 | 12,83 | 20,36 |
| | s | 1,38 | 1,16 | 1,12 | 2,04 | 1,59 | 1,34 | 0,91 | 6,31 |
| Shoulder without shank | x | 7,21 | 14,85 | 6,91 | 14,39 | 6,92 | 15,05 | 6,65 | 11,01 |
| | s | 0,98 | 0,95 | 0,69 | 0,70 | 1,07 | 0,95 | 0,45 | 3,67 |
| Total | x | 27,98 | 58,96 | 27,02 | 56,34 | 27,77 | 57,85 | 27,86 | 45,21[A] |

A- means with this index are statistically different (p<0,01)

**Fig. 1. Percentage of carcass with PSE meat based on measumerements in LD muscle**