

MEATNESS OF SWINE CARCASSES AND QUALITATIVE PROPERTIES OF MEAT  
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**SUMMARY:** The objective of this study was to determine the quality indicators of carcasses (thickness of backfat, share of meat according to the Book of Regulations, surface of m. long. dorsi and belonging bacon in the section between the 13th and 14th rib) and qualitative properties of muscle tissue ( $pH_{45}$ ,  $pH_k$ , WHC, consistency and colour - Göfo) in meat types of pigs. The carcasses were classified into two groups according to the percentage of meatness determined by dissection (42-49%; 49-56%). Differences in the meatness indicators between the groups were highly significant ( $P < 0.01$ ). The correlation between the meat yield in carcasses, thickness of backfat and yield of fat tissue was negative ( $r = -0.59^{**}$  and  $r = -0.57^{**}$ , respectively). The pig carcasses with a lower meat yield had more favourable qualitative properties of muscle tissue than the pigs of higher meat yield.

**INTRODUCTION:** The term high-quality meat refers to postmortal muscle tissue of certain organoleptic, nutritive, technological and hygienic properties. A gradual decomposition of glycogen followed by a slow decline in pH values is an usually occurring process in such a meat (Pribiš et al. 1987). Selection of pigs for better growth rate led to disturbance of homeostasis which is consequently, accompanied with higher tendency to stress susceptibility on the one hand and production of meat of lower quality on the other (the occurrence of PSE muscles). Since the genetic and paragenetic factors affect this process, the objective of this study was to determine the quality indicators of both pig carcasses and muscle tissue in pigs of high meatness.

**MATERIALS AND METHODS:** Using the Yugoslav standard procedures - JUS (Regulations, 1985), the thickness of backfat was measured and the meatness of warm carcasses was evaluated. A modified method (Weniger, 1963) was used to dissect the refrigerated carcasses into their main parts (neck, shoulder-joint, back, ham), slicing them further and severing the muscle and fat tissue with skin, as well as bones. Hamburger-bacon was cut off from the breast-cut area, whereas the tissues were formed by cutting up the remaining part. Therefore, the total tissue yield of carcasses excluded the tissue of hamburger-bacon and head. The fat tissue with skin included the mass of double chin and kidney fat. Dorsal area was cut up

between the 13th and 14th rib in order to determine the ratio between MLD (m. long. dorsi) and its share of fat. The section areas were determined by measuring dimensions of the mark produced between the 13th and 14th rib, and expressed in cm<sup>2</sup>. The MLD sample was used to determine the qualitative meat properties, such as pH<sub>45</sub> (45' p.m.), pH<sub>k</sub> (24 hours p.m.), WHC (Water Holding Capacity), consistency and colour. The carcasses were classified into two groups according to their meat yield. In the first group, meat yield ranged from 42 to 49%, whereas in the second group it ranged from 49 to 56%. Data were put through a computer using the SPSS program.

RESULTS AND DISCUSSION: Results obtained in this study are shown in Tables 1-3.

Table 1.-Qualitative properties of pig carcasses

Indicator	1 <sup>st</sup> group		2 <sup>nd</sup> group		Significance test
	$\bar{x}$	s	$\bar{x}$	s	
Mass of carcasses (kg)	75.73	3.37	76.51	2.57	NS
Sum of backfat thickness according to JUS (mm)	39.50	6.07	30.63	7.54	**
Meat from carcasses according to JUS: (kg)	32.66	1.52	33.87	1.54	**
(%)	42.61	1.15	43.56	0.90	**
Meat from carcasses - dissection: (kg)	35.29	1.43	39.53	1.39	**
(%)	46.70	1.61	51.67	2.24	**
Back cross: MLD (cm <sup>2</sup> )	34.94	4.40	39.13	4.83	**
fat tissue (cm <sup>2</sup> )	20.20	3.76	16.25	4.01	**

NS = non significant      \*\* P < 0.01

The mass of warm carcasses was uniform in both groups, which was one of the preconditions at establishing this investigation. It was found that the average thickness of backfat (back + cross) in the first group of carcasses was 39.50, whereas in the second group it was 30.63 mm, with a highly significant difference (P < 0.01). The meat yield of the carcasses determined according to the Book of Regulations (head and meat of hamburger-bacon were excluded) was higher in the second

group by 1.21 kg. The relative meat yield was also higher in the second group by 0.95%. The differences in the absolute and relative meat yield between the groups were highly significant ( $P < 0.01$ ). The meat yield determined by dissection was higher in the second group by 4.24 kg or 4.97%, which suggested that the lower disposition of fat tissue was followed by an increase in the portion of muscle tissue. The surfaces of m. long. dorsi and belonging bacon measured 34.94 cm<sup>2</sup> and 20.20 cm<sup>2</sup> for the first group, and 39.13 cm<sup>2</sup> and 16.25 cm<sup>2</sup> for the second one. The results of testing the difference in surface of m. lon. dorsi and belonging bacon between the groups were highly significant ( $P < 0.01$ ). The meat : bacon ratio determined in the section between the 13th and 14th rib was rather favourable in the both groups of carcasses (0.50 and 0.40, respectively). This study showed a link between the indicators of meatness, such as the thickness of backfat and the surface of m. long. dorsi including the total muscle tissues of pig carcasses.

Table 2.-Correlation between the qualitative properties of pig carcasses

Properties	1	2	3	4	5	6
1. Meat - JUS (kg)	/	0.60**	0.23*	-0.39	0.15	-0.24
2. Meat - JUS (%)		/	0.49**	-0.73**	0.26*	-0.44**
3. Meat - dissection (%)			/	-0.59**	0.53**	-0.57**
4. Thickness of backfat (mm)				/	0.14	0.51**
5. Surface of MLD (cm <sup>2</sup> )					/	-0.29*
6. Surface of bacon (cm <sup>2</sup> )						/

\*  $P < 0.05$

\*\*  $P < 0.01$

The qualitative properties of muscle tissue are shown in Table 3.

Table 3.-Indicators of some qualitative meat properties

Indicator	1 <sup>st</sup> group		2 <sup>nd</sup> group		Significance test
	$\bar{x}$	s	$\bar{x}$	s	
pH <sub>45</sub>	6.16	0.35	6.07	0.33	NS
pH <sub>k</sub>	5.67	0.27	5.61	0.23	NS
WHC (cm <sup>2</sup> )	6.38	1.60	6.71	1.18	NS
Consistency (cm <sup>2</sup> )	3.45	0.72	3.17	0.65	NS
Colour (Göfo)	60.52	4.03	58.73	4.32	**

NS = non significant

\*\*  $P < 0.01$

With carcasses of higher meatness, lower  $pH_{45}$  and  $pH_k$  values, poorer WHC and lower intensity of muscle tissue colour were observed. Lower pH values indicated faster process of glycolyses in muscles of these pigs. By analysing the frequency distribution of  $pH_{45}$  values up to 5.8, from 5.8 to 6.0 and above 6.0, the following percentages in the samples were found: 10%, 8% and 82% for the first group and 20%, 14% and 66% for the second one. The significant differences between the average values of two groups were found only for colour ( $P < 0.05$ ) and not for other qualities. Based on testing the portion of  $pH_{45} < 5.8$  in order to find out whether the difference in the presence of PSE muscles in the 1st and 2nd group was significant or ranged within the normal limits, it was found that the difference can be attributed to higher meatness ( $P < 0.01$ ). This fact was supported with testing of the proportion of  $pH_{45} < 6.0$ . According to Brisky (1964) and Honikel and Kim (1986), a rapid onset of temperature is possible, which causes a partial denaturation of proteins, increased permeability of sarcolemme which brings to presence of PSE meat. This phenomena occur more frequently in pigs of high meatness, which agrees with results attained in this study. While determining the possible correlations between certain properties, positive correlation was found between  $pH_{45}$  and meat colour ( $r = 0.26^*$ ) on the one hand, and between meat colour and consistency on the other ( $r = 0.40^{**}$ ). These results agree with those of Rahelić et al. (1978).

CONCLUSIONS: From the results of this study and discussion, the following conclusions have been drawn:

- By classifying the pig carcasses according to their meatness (1st group 42-49%; 2nd group 49-56% of meat), and the analysis of their qualitative properties, it was found that the 2nd group had a significantly thinner backfat (30.63 mm; 30.50 mm), a bigger MLD surface (37.13 cm; 34.94 cm<sup>2</sup>) and a smaller surface of sharing bacon (16.25 cm<sup>2</sup>; 20.20 cm<sup>2</sup>),
- Correlation between the thickness of backfat and meat percentages in carcasses determined by JUS ( $r = -0.73^{**}$ ) and dissection ( $r = -0.59^{**}$ ) was negative,
- By analysis of the qualitative properties of muscle tissue, the following means were obtained:  $pH_{45}$  6.16; 6.07,  $pH_k$  5.67; 5.61, WHC 6.38; 6.71, consistency 3.45; 3.17, meat colour 60.52; 58.73 for the first and second group, respectively. Though the significant differences were found for the meat colour only ( $P < 0.05$ ), it was determined that the pig carcasses with lower meat yield had more favourable qualitative properties of muscle tissue when compared the carcasses of higher meat yield.

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