PARTICIPATION AND QUALITY OF SOME TISSUES IN PIG CARCASSES OF DIFFERENT PRODUCTION TYPES

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INTRODUCTION

The great advantage obtained by creation of meaty pigs, which yield in greater muscle participation and less fatty tissues in relation to fatty and fatty-meaty types, brings along and some problems. It is known that through creation of noble meaty pig breeds and through hasty increase of muscle tissue participation emerged some unwanted phenomena which appeared as PSE of meat. Some similar phenomena were described in the 19 th century but not explained. This phenomena has become more frequent and more observed through an intensive ennobling. Ludvigsen (1954, 1955) wrote that he established "that an outstanding relation is present between well-built musculature of corpse of slaughtered pig, ... and occurrence of light-watery muscles during the life as well as port mortem". Since then, to these problems more and more attention is paid in expert literature (Briskey 1964; Einkelenboom 1972 and 1978; Vos and Sybesma 1972; Sybesma 1976; Kallwit 1985; Volstra 1986; Glodek 1986 and others), because the occurrence of some unwanted characteristics of pork meat has become a special problem.

Because of above mentioned and because of the circumstances that we were in opportunity to organise slaughtering of certain number of pigs of fatty and fatty-meaty types, we decided to start with these researches. The research of participation of some tissues and their qualitative characteristics of such pigs compared to meaty types has a special importance, since fatty and fatty-meaty breeds are very rare today.

MATERIALS AND METHODS

The researches are performed on primary treated corpses and cooled pig carcasses of different production types, of which in four groups were 22 pairs: the first group = fatty (Mangalitsa Breed), the second group = fatty-meaty (Black Slavonian Breed), the third group = meaty (Thrigeneric Hybrids: Swedish Landrace x Big Yorkshire x German Landrace) and the fourth group = outstanding meaty (Hybrid Pig "Hypor").

The dissection of all carcasses was performed as per Weniger (1963) method, with the aim to determine the quantity of meat, fat tissues (with skin), bones and less valuable parts (head, lower parts of legs, tail and kidneys). The samples of meat and fat tissue are taken from *m.longissimus dorsi* (MLD) and belonging bacon of dorsal side in height of the 13 th and 14 th inter-rib space. In chemical composition of meat and fat tissue it is determined the percentage of water level, protein, fat and ash, and from qualitative meat characteristics: values for pH_1 (45 minutes post mortem) and pH_2 (24 hours post mortem), water binding capacity (W.B.C.) and meat colour.

Water was determined by drying method in simple drier at temperature of 105°C to the constant mass.

The total proteins are determined as per Kjeldahl method with the help of a micro-alembic as per Parnas-Wagner.

Fat was determined by extraction method with ether as per Soxhlet.

The total ash was determined by method of direct burning at temperature of 550°C.

pH-values were measured by contact pH-meter "Laska" Vienna.

The water binding capacity (W.B.C.) of meat was determined as per Grau-Hamm.

The meat colour was estimated with the apparatus "Göfo" for meat colour measuring.

The obtained results are processed by acknowledged statistical methods.

RESULTS AND DISCUSSION

By application of ahead described technic and work methods on selected samples all foreseen researches were performed and the obtained results are shown in the figures 1-4.

The results from figure 1 confirm the statements made in the literature about these problems (Clausen 1959; Patton 1971; Rahelic 1978 and others). In our case the differences in participation of some tissues were obvious

Figure 1 - Participation of some tissues and less valuable parts in carcasses

Indicator		Group I		Group II		Group III		Group IV	
		$\bar{x}$	Vk	$\bar{x}$	Vk	$\bar{x}$	Vk	$\bar{x}$	Vk
Mass of cooled carcasses	kg	80,11	1,95	79,80	3,03	77,27	2,53	78,27	2,33
	%	100,00		100,00		100,00		100,00	
Muscle tissue	kg	23,03	3,64	26,01	5,73	38,34	4,04	45,06	4,63
	%	28,75	2,26	32,59	4,05	49,62	2,76	57,57	3,92
Fat tissue	kg	41,57	2,14	38,43	5,28	25,34	6,15	18,87	9,33
	%	51,89	1,98	48,16	3,27	32,79	6,08	24,11	8,84
Bons	kg	7,65	6,00	7,93	7,56	7,38	7,83	7,94	6,85
	%	9,55	5,01	9,94	8,44	9,55	7,73	10,14	7,19
Less valuable parts	kg	7,86	5,97	7,43	7,40	6,21	8,02	6,40	7,18
	%	9,81	6,44	9,31	8,57	8,04	6,55	8,18	7,58

Figure 2 - Indicators of some qualitative meat characteristics

Indicator	Group I		II		III		IV	
	$\bar{x}$	Vk	$\bar{x}$	Vk	$\bar{x}$	Vk	$\bar{x}$	Vk
pH_1	6,75	3,85	6,48	4,47	6,18	5,66	6,12	6,53
pH_2	5,52	2,17	5,62	2,13	5,57	3,05	5,61	3,03
W.B.C.(cm^2)	3,30	10,00	5,07	11,30	6,94	22,48	6,95	19,96
Colour	69,58	7,97	68,00	8,33	60,77	9,43	63,32	9,42

Figure 3- Chemical composition of meat

Content	Group I		II		III		IV	
	$\bar{x}$	Vk	$\bar{x}$	Vk	$\bar{x}$	Vk	$\bar{x}$	Vk
Water	70,14	1,29	70,36	1,09	72,51	1,76	73,37	1,37
Protein	20,65	4,02	20,70	3,43	23,48	3,45	23,54	5,99
Fat	8,21	17,66	7,86	13,98	2,86	39,16	2,23	35,87
Ash	1,00	9,00	1,08	8,33	1,15	6,95	1,12	4,46

Figure 4 - Chemical composition of fat tissue

Content	Group I		II		III		IV	
	$\bar{x}$	Vk	$\bar{x}$	Vk	$\bar{x}$	Vk	$\bar{x}$	Vk
Water	14,18	9,80	15,12	10,68	17,38	10,58	19,89	9,35
Protein	4,39	16,63	4,60	15,43	5,00	18,00	5,03	13,32
Fat	81,31	0,93	79,99	1,37	77,27	1,91	74,64	6,83
Ash	0,23	34,78	0,31	25,80	0,36	22,22	0,44	34,09

at first sight. The percentage participation of muscle tissue in carcasses was the highest in the fourth group (28.75%), whereas it was vice versa by fat tissue (IV = 24.11%; I = 51.89%), and the differences were more than double.

The tested differences between some groups showed that in most cases they were significant on the level $P < 0.01$ (except for participation of bones).

The showed values in the figure 2 point out the differences of some indicators of quality. The obtained mean pH_1-values were more optional in the first and second group (6.75; 6.12) what is also in satisfactory limits. The tested differences for pH_1-values of meat were highly significant ($P < 0.01$) between all groups, except between the third and fourth group where the difference was not significant. The differences for pH_2-values were significant only between the first and second group ($P < 0,01$). Concerning the water binding capacity (W.B.C.) the results show expressively more favorable condition in meat of the first and second group, thus of primitive pig breeds origin. The tested differences between the first and other groups and between the second and fourth, were highly significant ($P < 0.01$), and between the second and third on the level of $P < 0.05$ whereas between the third and fourth they were not significant. The similar situation was in connection with meat colour, but the differences between the groups were highly significant. These results are identical with statements of other authors (Wismer and Pedersen 1959; Briskey 1964; Rahelic at al. 1968; Petricevic at al. 1982,1985; Kallwit 1985 and others), which have concluded that the meat of more primitive breeds (fatty and fatty-meaty types) regularly show better results which point out on desirable pH-values, on better water binding capacity and on desirable colour.

The percentage of some meat components shown in the figure 3 indicates that more fatty pigs (I and II group) contain in their meat less water and protein for approx. 2.3 - 3.2% compared to meaty types (III and IV group). At the same time, the meat ion the first and second group contained 5.5 - 6% more fat compared to those in the third and fourth group, whereas the value of ash participation was significantly lower only in the first group in relation to other groups. The similar relations of chemical composition of meat (MLD) by Mangalitsa and Black Slavonian Breed, in relation to meat of meaty breeds were established by Ilancic at al. (1966), Rahelic at al. (1978) and others. The tested differences were highly significant ($P < 0.01$) for all characteristics (except ash) and except between the first and second and the third and fourth group.

The chemical composition of fat tissue shown in the figure 4 indicates that, similar as in meat, it was less water (approx. 3 - 4%) and protein (approx. 0.4 - 0.6%) by fatty breeds (I and II group) in relation to meaty pigs (III and IV group). The fat participation in fat tissue in the first group was the highest (81.31%) whereas in the fourth group it was the lowest (74.64%), but the participation of ash was vice versa. The similar relation of fat tissue by fatty, semi-fatty and meaty pigs also presented Lawrie (1978). The tested differences for some components

between groups were in most cases significant on the level $P < 0.01$.

CONCLUSION

On the basis of obtained results of this research, the following could be concluded:

1 - In primary processed carcasses of rather equalized mass, muscle tissue was in the fourth group mostly (Hypor - 57.57%), and more than half less in the first group (Mangalitsa - 28.75%), whereas in the carcasses of the third group it was 49.62% and in the second 32.59%. The participation of fat tissue showed an inverse tendency. This relation of muscle and fat tissue by some breeds or hybrids pigs points to on a great progress in creation of meaty pigs. The participation of bones and less valuable parts differentiated not that much.

2 - The indicators of particular qualitative characteristics, i.a. pH-values, water binding capacity and meat colour - all of them point out a better meat quality by pigs in the first and second group, i.e. of that of primitive breeds (Mangalitsa and Black Slavonian) in relation to meat of meaty and outstanding meaty pigs.

3 - The chemical composition of muscle and fat tissue in water and protein participation, showed the gradual increase tendency, from fatty to fatty-meaty and to outstanding meaty types, where the percentage participation of fat was in meat and bacon of fatty pigs, whereas the differences in participation of ash between the groups were not that important.

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