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SHARE, DISTRIBUTION AND QUALITY OF MEAT IN CARCASSES OF PIGS OF DIFFERENT GENOTYPE

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Background:

Profitability in pig production largely depends on current state at market, but first of all it depends on the carcass quality which is predominantely determined by genotype. For this reason, actual problems in pig production can be relatively quickly solved by more intensive production of fattening pigs with increased meat percentage in the carcasses and satisfying technological traits of the meat. In this research interest was layed on production results of pigs fattened under the same conditions, but with different genotype. The fattening included one group of crossed pigs, two groups of the same breed, and two groups of hybrid pigs, often in Croatian pig production. Similar research on this and other pig genotypes were done by Kralik et al. (1990, 1997), Petricevic et al. (1990, 1991), Sencic et al. (1995) and Kusec et al.(1998).

Material and methods:

This research included 210 pigs of five different genotypes: A = (Swedish Landrace x Large White) x German Landrace; B = Line 1; C = Hypor hybrid; D = Swedish Landrace and E = Large White, fattened under the same production conditions. Animals were fed ad libitum from 25-60 kg with diet ST_1 (16.5% crude proteins), and further up to around 100 kg live weight with diet ST_2 (14.5% crude proteins). For further investigation right sides of the carcasses from male castrates and female pigs (15 of each) were taken (150 half-carcasses in total). Measures of pH_{45} were taken from warm carcasses (within 45' post mortem) by probe in the region between 13^{th} and 14^{th} rib on m.longissimus dorsi (MLD). After this carcasses lengths were taken (os pubis – 1^{st} rib) as well as the length and circumference of the ham, for calculation of the ham index. Cooled right halves of the carcasses were cut (Weniger et al. 1963) on main parts (ham, back, belly-rib part, neck, shoulder), further precisely dissected on muscle tissue, fat with skin and bones. Less valuable parts included head, glands, legs, tail and kidneys. On the loin cut (between 13^{th} and 14^{th} rib) muscle and belonging fat area (cm^2) was measured by Comberg (1978) method. These measures were used in calculation of fat/MLD ratio. At the same place pH_{24} value (24 hours post mortem) and color of the meat (Göfo) were measured, and the sample was taken for determination of water holding capacity – w.h.c. (cm^2) by compression method according to Grau & Hamm (1952). Statistical analysis was performed using STATISTICA ver. 6.0 programm.

Results and discussions:

The results of linear measures of swine carcasses and of meat quality are given in table 1. Significant differences ($P<0.05$) were found in the carcass length, ham index and w.h.c. between genotypes, while there were no statistically significant differences regarding the sex ($P>0.05$). The fat/MLD ratio in loin cut showed significant differences between sexes and groups ($P<0.05$); the largest MLD area was found in females from group "B", and smallest in castrates from group "E" (difference = 22%). For values of pH_{45} and pH_{24}, meat color and w.h.c., which were all within boudaries established for "normal" meat, statistically significant difference ($P<0.05$) was found only in w.h.c., between genotypes. All indicators mentioned above are similar to the results noted in researches of Petricevic et al. (1990), Sencic et al. (1995), Kralik et al.(1996) and others.

It is obvious from table 2 that marked advantage of certain genotype, only on the basis of main carcass parts shares, can not be stated, although the differences were statistically very significant ($P<0.01$). But if the meat percentage is taken in consideration as the main indicator of carcass quality, it is obvious that best results in the share of meat in the carcass as well as in the individual parts (exluding the shoulder) showed female pigs "B" genotype, while the lowest meat percentage was found in castrates of "A" genotype. Difference was 10.24 percentage units or 17.30%. Tested differences for this trait were mostly statistically very significant ($P<0.01$) between sexes and genotypes. It should be emphasized that meatiness of carcasses of "B" genotypes from castrates compared to females was a little bit lower, but still better than the most of other genotypes. Regarding the meatiness, the closest to genotype "B" were genotypes "C" and "D", while the lowest meat percentages were found in genotypes "E" and "A".

Conclusions:

On the basis of this results it can be concluded:

Linear measurements did not show marked differences between genotypes of pigs, with the exception of females of genotype "B" where the largest MLD area (42.16 cm^2) was found and statistically significant difference ($P<0.05$) was established only regarding the genotype.

Mean values of meat quality indicators were within boundaries established for "normal" meat, and statistically significant difference ($P<0.05$) was found only in w.h.c. between the genotypes.

Differences in shares of individual carcass parts between the genotypes were statistically very significant ($P<0.01$), except in the ham ($P<0.05$), while no significant differences were found regarding the sex ($P>0.05$).

In the meat percentage in carcass and in individual parts (except in the neck and shoulder) there were statistically very significant differences ($P<0.01$) between genotypes and sex. The highest average meat shares (except in shoulder) was found in both sexes of genotype "B" followed by genotypes "C", "D" and "E", while genotype"A" showed the lowest results.

Pertinent literature

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Table 1. Linear measurements of swine carcasses and quality of meat

Trait	Genotype										F - test	
	A		B		C		D		E			
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Sex	Genotype
Carcass length, cm	84.94	86.19	80.32	81.36	82.37	81.41	81.95	83.84	80.73	81.33	n.s.	*
Ham index	42.54	43.59	43.12	42.63	43.04	44.07	44.89	45.35	42.27	41.32	n.s.	*
MLD, cm^2	37.08	36.93	41.19	42.16	37.54	39.84	34.27	36.07	32.74	38.01	n.s.	*
Fat, cm^2	29.66	21.39	18.74	17.96	22.84	16.41	21.00	16.89	26.93	23.37	*	n.s.
Fat/MLD ratio	0.81	0.58	0.46	0.43	0.62	0.42	0.62	0.48	0.83	0.66	*	*
$pH_{45'}$	6.33	6.27	6.10	6.13	6.03	6.06	6.25	6.21	6.35	6.09	n.s.	n.s.
pH_{24}	5.75	5.73	5.72	5.73	5.70	5.69	5.82	5.73	5.73	5.76	n.s.	n.s.
W.h.c., cm^2	8.59	8.76	8.21	8.23	7.47	8.51	7.06	6.74	6.84	7.59	n.s.	*
Color, Göfo value	59.69	59.19	62.39	65.07	60.07	67.52	51.74	52.58	53.00	66.67	n.s.	n.s.

*P<0.05 n.s. P>0.05

Table 2. Pig carcass quality

Share - trait	Genotype										F - test	
	A		B		C		D		E			
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Sex	Genotype
Carcass weight (kg)	80.01	78.66	79.86	78.82	79.11	78.04	82.21	80.17	82.27	80.63	**	**
Share in carcass (%)												
Ham	27.72	27.98	29.66	29.70	28.94	29.32	26.74	27.68	28.99	28.16	n.s.	*
Back	15.28	16.33	15.65	15.93	17.24	17.65	19.12	19.15	17.10	17.19	n.s.	**
Belly-rib part	21.41	20.42	17.29	17.47	17.65	17.56	16.89	16.39	16.93	16.98	n.s.	**
Neck	8.08	7.89	8.23	8.18	8.48	8.07	9.65	9.52	8.68	8.96	n.s.	**
Shoulder	13.78	13.87	16.00	15.87	15.41	14.65	15.73	15.80	15.84	15.64	n.s.	**
Less valuable parts	6.89	7.51	8.05	7.68	7.11	7.95	7.37	7.58	6.80	7.23	n.s.	n.s.
Muscle tissue	48.92	52.55	57.32	59.16	55.31	56.76	54.14	57.86	51.15	53.20	**	**
Fat with skin	34.23	29.19	24.29	23.12	27.51	23.45	28.10	23.74	32.35	29.94	**	**
Bones	9.96	10.75	10.34	10.04	10.07	11.84	10.49	10.82	9.70	9.63	n.s.	n.s.
Share in ham (%)												
Muscle tissue	62.13	65.48	70.60	72.18	66.95	71.09	64.61	69.78	62.60	64.86	**	**
Fat with skin	27.28	22.75	18.34	17.18	22.32	17.22	24.07	19.16	26.76	25.19	*	*
Bones	10.59	11.77	11.06	10.64	10.73	11.69	11.32	11.06	10.64	9.95	n.s.	n.s.
Share in back (%)												
Muscle tissue	52.78	58.72	60.67	65.22	57.97	59.53	54.07	58.99	49.17	54.23	**	**
Fat with skin	33.81	26.54	24.41	21.52	28.97	23.53	32.00	26.32	38.34	32.99	**	**
Bones	13.41	14.74	14.92	13.26	13.06	16.94	13.93	19.69	12.49	12.78	n.s.	n.s.
Share in belly-rib part (%)												
Muscle tissue	47.80	51.83	61.39	62.87	58.66	59.22	57.13	59.41	53.77	56.33	*	**
Fat with skin	43.52	39.62	30.16	28.42	33.13	30.96	34.09	31.35	38.48	35.08	**	***
Bones	8.68	8.55	8.45	8.71	8.21	9.82	8.78	9.24	7.75	8.59	n.s.	n.s.
Share in neck (%)												
Muscle tissue	64.84	68.62	69.15	70.23	65.83	65.26	64.49	66.28	63.07	67.06	n.s.	n.s.
Fat with skin	19.10	14.54	17.57	15.85	18.74	14.38	21.42	17.91	20.63	17.94	**	*
Bones	16.06	16.84	13.28	13.92	15.43	20.36	14.39	15.81	16.30	15.00	n.s.	n.s.
Share in shoulder (%)												
Muscle tissue	57.92	62.76	66.02	66.84	65.42	66.77	68.00	71.04	63.77	64.43	n.s.	*
Fat with skin	28.60	22.88	20.37	19.82	21.81	19.17	19.72	16.68	25.02	24.06	*	*
Bones	13.48	14.36	13.61	13.34	12.77	14.16	12.28	12.28	11.21	11.51	n.s.	*

*P<0.05 **P<0.01 ***P<0.001 n.s. P>0.05