DIFFERENCES BETWEEN THE PROGENY GROUPS IN THE STRUCTURE OF SWINE BODY

Ivan Jurić, Marija Djikić*, Sonja Jovanovac**

* Faculty of Agricultural Sciences University of Zagreb, Šimunska 25, Zagreb, Yugoslavia

** Agricultural Faculty, Osijek Tenjska c. bb, 54000 Osijek, Yugoslavia

SUMMARY: A comparison has been made between the progenies of five Hypor hybrids sires on their traits like meatness of the carcasses, bone portion, muscular and fat tissue portion in the carcasses. The technologic properties of meat were also analysed. The number of progenies according to a sire per group proceeded from n = 10 to n = 24. The meatness of carcasses was determined by YU standard (YUS). The portion of bones, muscular and fat tissue was ascertained by means of dissection. The dissection was carried out by Weniger´s method, modified by A. Petričević. The weight of carcasses along the groups was: 77,95 ± 0.6oo; 76.1o ± 0.752; 76.94 ± 0.761; 76.94 ± 0.7o2; 77.87 ± 0.682. There was no statistically significant difference along the groups. The meatness of the carcasses (YUS) in the groups was: 42.97 ± 0.3io; 43.78 ± 0.461; 43.45 ± 0.252; 42.98 ± 0.364; 43.86 ± 0.243. The difference between two groups of the lowest meatness and a group of the highest meatness was determined statistically. This difference is significant on a five percent level. The bone percentages in the carcass were: 10.o7 ± 0.133; 11.26 ± 0.348; 10.42 ± 0.12o; 10.61 ± 0.237; 10.73 ± 0.14o. There were significant differences between certain groups in the percentage of bones in carcasses. The percentage of muscular tissue in carcasses was: 48.72 ± 0.754; 51.23 ± 1.oo1; 49.44 ± 0.637; 49.o5± 0.8o7; 49.93 ± 0.649. A statistically significant difference was determined between the groups with the lowest and the highest percentage of muscular tissue in carcasses.

Fat tissue percentage in a carcass along the groups was: 21.86 ± 0.693; 17.71 ± 1.o36; 20.82 ± 0.580 20.72 ± 0.771; 19.63 ± 0.57o. Here again, the difference between the groups with the highest and the lowest percentage of fat tissue in the carcass, was statistically significant. Dissection´s results analysis for certain parts of the carcass (ham-leg loin shoulder, neck, belly, less valuable parts) showed that there was guite a significant variability between the groups, according to the sires. The composition of certain parts of the carcasses (muscular tissue, fat tissue, bones) differred by the individual sires. As no statistically significant difference was determined between the progeny groups by the sires, the pH value taken immediately the slaughter and 24 hours after the slaughter, was also not different. This investigation enables us to conclude that individual progeny gropus descending from miscellaneous sires, differ statistically in their traits: the portion of bones, muscular and fat tissues, as well as in the meatness of carcasses measured by YUS.

INTRODUCTION: According to Politiek and Bekker (1982), the greatest economic effects are gained by the selection of meatness in the carcasses. Topel´s analysis (1986) pointed out that meat industry was going to favour the increase of meatness in the production of pigs. A survey by Bichard & Ann Bruce (1989) convinces us even more that the trait of meatness in pigs will be on the increase in future.

While cross breeding, the individual pig lines are expected to have high frequency of recessive Hal-gene (Anderson at all, 1981, Smith & Webb, 1981). The presence of high Hal-gene frequency in a line confirms the fact that the hybrids of such a line, as hybrid boars, will offer the progeny

of quite different meatness of the carcasses. The results of our former investigations (Jurić et al., 1987 a, 1987 b) show that such differences exist. Former investigations (Nikolić et al., 1970) showed significant differences in pig´s meatness between certain breeds, and the same results were given by Fortino et al. (1987 a & 1987 b).

MATERIALS AND METHODS: The investigation has been carried out on a Hypor hybrid. Dissection was performed on ABCD fattened pigs, produced by crossing AB boars with CD sows. The sows were chosen at random and the fattening went on simultaneously and in the same manner for the progenies of all boars. The fattened pigs were slaughtered 18 to 20 hours after being delivered to the slaughterhouse. Dissection was performed by Weniger´s method, modified by Petričević (Petričević et al., 1985). All right side carcasses were dissected after 24 hours of chilling.

Yugoslav standard (YUS) meatness evaluation was done according to: "Meat Quality Book of Rules ECL.021, 1985".

pH value was determined immedially after and 24 hours after the slaughter. In dealing with data, a method by Stana Barić (1965) and Snedecor & Cochran (1967) were used. Variance analysis was used in testing the difference between progeny groups. Groups at five percent level of significance were compared.

Table 1 Mass and Composition of the Carcasses

		Sires									
		A		B		C		D		E	
	n	19		10		16		18		24	
		$\bar{x}$	$s_{\bar{x}}$	$\bar{x}$	$s_{\bar{x}}$	$\bar{x}$	$s_{\bar{x}}$	$\bar{x}$	$s_{\bar{x}}$	$\bar{x}$	$s_{\bar{x}}$
Mass of warm carcasses	kg	77.95	0.600	76.10	0.752	76.94	0.761	76.94	0.702	77.87	0.682
Mass of chilled carcass	kg	38.42	0.309	37.40	0.314	37.91	0.396	37.78	0.355	38.44	0.336
Muscular tissue	%	48.72^{b}	0.754	51.23^{a}	1.001	49.44	0.637	49.05	0.807	49.93	0.649
Fat tissue	%	21.86^{bd}	0.693	17.71^{acd}	1.036	20.82^{b}	0.580	20.72^{a}	0.771	19.63^{a}	0.570
Bones	%	10.07^{bde}	0.133	11.26^{acd}	0.348	10.42^{b}	0.120	10.61^{b}	0.237	10.73^{a}	0.140
Less valuable parts,	%	8.24^{b}	0.158	8.92^{ace}	0.356	8.08^{b}	0.128	8.37	0.179	8.30^{b}	0.139
Hamburger fat	%	11.11^{b}	0.236	10.88^{ace}	0.380	11.24^{b}	0.223	11.25	0.235	11.41^{b}	0.172

a,b,c,d,e $P < 0.05$

The results shown in Table 1. indicate that there were statistically significant differences for the parts of the carcasses between the progenies of certain sires.

The portion of the main parts of carcass (ham-leg, loin, shoulder, neck and belly breast-cut without the head and other less valuable parts) are shown in Table 2.

Table 2 The portion of the main parts of a carcass (%)

Sires	n		Ham-leg	Loin	Shoulder	Neck	Belly Breast-cut
A	19	$\bar{x}$	27,99	19,o7	14,91	7,99	17,o3
		$s_{\bar{x}}$	0.344	0.324	0.192	0.177	0.249
B	10	$\bar{x}$	28,83^{c}	19.28	14.99	7.41^{c}	16.20^{c}
		$s_{\bar{x}}$	0.358	0.352	0.282	0.308	0.640
C	16	$\bar{x}$	27.28^{b}	19.14	15.20	8.21^{b}	17.70^{b}
		$s_{\bar{x}}$	0.239	0.312	0.180	0.181	0.281
D	18	$\bar{x}$	27.95	19.45	14.96	7.76	17.oo
		$s_{\bar{x}}$	0.366	0.238	0.217	0.201	0.315
E	24	$\bar{x}$	28.01	19.65	15.02	7.80	17.13
		$s_{\bar{x}}$	0.275	0.252	0.165	0.174	0.221

a,b,c,d,e $P < 0.o5$

The results show that the statistically significant differences were determined for the progeny of BC boars only (ham-leg percentage in the carcass and neck and belly breast-cut percentage). The progenies of the boars

who had higher percent of ham-leg had lower percentage share of neck and belly breast-cut in the carcass.

In further analysis the composition of ham-leg, loin, shoulder, neck and belly breast-cut have been compared and percentage of muscular and fat tissue and bones of every mentioned part of the carcass has been determined. The composition of ham-leg is shown in Table 3.

Table 3 Percentage of muscular and fat tissue, and bones in ham-leg

Sires	n	Muscular tissue $\bar{x}$	Muscular tissue $s_{\bar{x}}$	Fat tissue $\bar{x}$	Fat tissue $s_{\bar{x}}$	Bones $\bar{x}$	Bones $s_{\bar{x}}$
A	19	66.93^{b}	0.924	21.95^{be}	1.012	11.12^{bcde}	0.201
B	10	70.27^{ad}	1.113	17.24^{ad}	1.090	12.49^{a}	0.430
C	16	68.06	0.715	19.96	0.716	11.97^{a}	0.169
D	18	67.15^{b}	1.006	20.73^{b}	0.974	12.12^{a}	0.252
E	24	68.56	0.793	19.47^{a}	0.744	11.97^{a}	0.164

abcde $P < 0.05$

The composition of ham-leg shown in Table 3 was statistically different from group to group. The boars whose progeny had the highest percent of meat in ham-leg, had also the highest percent of bones in ham-leg. The same situation was found for the loin, as shown in Table 4.

Table 4. Percentage of muscular and fat tissue, and bones in loin

Sires	n	Muscular tissue $\bar{x}$	Muscular tissue $s_{\bar{x}}$	Fat tissue $\bar{x}$	Fat tissue $s_{\bar{x}}$	Bones $\bar{x}$	Bones $s_{\bar{x}}$
A	19	58.26^{b}	1.267	26.43^{be}	1.453	15.31	0.341
B	10	63.81^{a}	1.294	19.87^{acd}	1.647	16.31	0.588
C	16	60.27	1.115	24.30^{b}	0.998	15.43	0.443
D	18	60.68	1.013	24.20^{b}	1.329	15.12^{e}	0.505
E	24	60.47	1.534	23.07^{a}	0.931	16.46^{d}	0.285

a,b,c,d,e $P < 0.05$

As shown in Table 4, the progenies of individual sires differ significantly in loin composition in all three parts of the tissue.

The composition of shoulder is shown in Table 5.

Table 5. Percentage of muscular and fat tissue, and bones in shoulder

Sires	n	Muscular tissue $\bar{x}$	Muscular tissue $s_{\bar{x}}$	Fat tissue $\bar{x}$	Fat tissue $s_{\bar{x}}$	Bones $\bar{x}$	Bones $s_{\bar{x}}$
A	19	69.19	0.421	16.94	0.752	13.87^{b}	0.295
B	10	68.40	1.003	16.44	1.088	15.16^{ace}	0.361
C	16	67.84	0.908	18.31	0.896	13.85^{b}	0.145
D	18	67.26	0.875	18.34	0.873	14.40	0.270
E	24	67.92	0.592	17.91	0.668	14.17^{b}	0.241

a,b,c,d,e $P < 0.05$

The results in Table 5 show that the progenies of certain sires do not differ in meat and fat percent of the shoulder. The sire B had the highest bone percent in shoulder. The same sire had most meat and bones in ham-leg and loin.

The composition of neck is shown in Table 6.

Table 6. Percentage of muscular and fat tissue, and bones in neck

Sires		Muscular tissue		Fat tissue		Bones	
		$\bar{x}$	$s_{\bar{x}}$	$\bar{x}$	$s_{\bar{x}}$	$\bar{x}$	$s_{\bar{x}}$
A	19	68.61	0.679	17.63^{bd}	0.706	13.75^{bde}	0.510
B	10	69.95	0.889	14.54^{ace}	0.840	15.51^{a}	0.500
C	16	68.02	0.721	17.97^{be}	0.668	14.01^{de}	0.517
D	18	68.79	0.866	15.31^{ac}	0.729	15.90^{ac}	0.545
E	24	68.11	0.747	16.33^{bc}	0.636	15.56^{ac}	0.499

a,b,c,d,e $P < 0.05$

The results in Table 6 show that the progenies of sires do not differ in meat percentage of the neck as is with meat percentage of the shoulder. Nevertheless, the differences in fat tissue percentage, as well as in bone percentage in the neck, are statistically significant. The portion of certain parts of belly breast-cut is shown in Table 7.

Table 7. Composition of belly breast-cut (%)

Sires	n	Hamburger fat $\bar{x}$	Hamburger fat $s_{\bar{x}}$	Section of musculat tissue $\bar{x}$	Section of musculat tissue $s_{\bar{x}}$	Section of fat tissue $\bar{x}$	Section of fat tissue $s_{\bar{x}}$	Bones $\bar{x}$	Bones $s_{\bar{x}}$
A	19	65.13	0.690	18.88	0.604	10.73	0.406	5.27^{b}	0.211
B	10	65.23	1.647	19.40	1.165	9.04^{c}	0.601	6.33^{acde}	0.444
C	16	63.61^{de}	1.166	19.97^{d}	0.613	11.08^{b}	0.931	5.34^{b}	0.190
D	18	66.21^{c}	0.736	18.29^{c}	0.597	10.24	0.633	5.26^{b}	0.264
E	24	66.42^{c}	0.561	19.03	0.39o	9.55	0.350	5.01^{b}	0.165

a,b,c,d,e, $P < 0.05$

The progenies of B sire who have the highest percent of muscular tissue and bones in the carcass (Table 1), had also significantly higher percent of bones in belly breast-cut than all the rest of the progeny groups.

The meatness of the carcasses measured by YU standard and pH value are shown in Table 8.

Table 8 Meatness by YU standard and pH value

Sires		pH_1		pH_2		% of meat by YUS	
	n	$\bar{x}$	$s_{\bar{x}}$	$\bar{x}$	$s_{\bar{x}}$	$\bar{x}$	$s_{\bar{x}}$
A	19	6.116	0.091	5.600	0.043	42.97^{e}	0.310
B	10	6.160	0.090	5.680	0.042	43.78	0.461
C	16	6.137	0.101	5.619	0.042	43.45	0.252
D	18	6.022	0.079	5.578	0.037	42.98^{e}	0.364
E	24	6.146	0.059	5.679	0.040	43.86^{ad}	0.243

a,b,c,d,e $P < 0.05$

The results shown in Table 8 show that there was a difference in the meatness measured by YUS between groups. Also, the difference between the sires for pH_1 and pH_2 values was not determined for the progenies of miscellaneous sires.

CONCLUSIONS: The investigation showed that the progenies of individual sires (are AB Hypor hybrid boars) differ in the portion of muscular and fat tissues and bones in the carcasses. They differ in the composition of certain parts of the carcass (ham-leg, loin, shoulder, neck, belly-breast-cut as well.

The composition of certain parts of the carcasses, shown as the percentage of muscular and fat tissue and bones, differ as well because certain AB-Hypor hibrid boars give parts of carcasses with various portions of the tissue analysed. The differencies between the progenies of various sires are not determined for pH_1 and pH_2 values.

REFERENCES:

- Andresen,E., Jensen,P.Patricia, Barton - Gade (1981) Journal of Animal Breeding and Genetics 98 (3)
- Barić,Stana (1965) Statističke metode primjenjene u stočarstvu, Zagreb.
- Bichard,M., Bruce,E.Ann (1989) Outlook on Agriculture 18 (4)
- Fortein,A., Wood, J.D., Whelehan, O.P.,a(1987) Journal of Agricultural Science Camb. 108 (1)
- Fortin, A., Wood, J.D., Whelehan, O.P.[b] (1987) Journal of Agricultural Science Camb. 108 (1)
- Jurić, I., Petričević,A., Djikić, Marija, Levaković, F., Frleta, D., [a] (1987) Zbornik IX Skup svinjogojaca Jugoslavije, Osijek, 117-122
- Jurić, I., Frleta, D., Djikić, Marija, Levaković, F., [b] (1987) Zbornik IX Skup svinjogojaca Jugoslavije, Osijek, 123-126.
- Nikolić,D., Mančić, D., (1970) Arhiv za poljoprivredne nauke 81: 16.
- Petričević, A., Jurić, I., Kralik, Gordana, (1985) Agrosaznanja, Titograd 3:160.
- Politiek, R.D., Bakker, J.J.(1982) Livestock production in Europe, ECPC, Amsterdam, Oxford, New York.
- Smith, C., Webb, A.J., (1981), Sonderdruck aus Zeitschrift für Tierzüchtung und Züchtungsbiologie Bd 98, H.3:161.
- Snedecor, G.W.W., Cochran, W.G. (1967), Statistical Methods, Iowa State University Press Amess Iowa USA.
- Topel, D.G.(1986) Journal Animal Science 63:633.
- Pravilnik o kvaliteti mesa ECl 021 (1985)