

## MEATINESS AND QUALITATIVE MEAT PROPERTIES OF CROATIAN CROSSBREDS AND HYPOR PIGS

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### Summary

This research was performed on the 90 pig carcasses of the crossbreeds formed from Large White, Swedish Landrace and German Landrace, referred as Croatian Crossbreed (CCB), and 130 Carcasses of Hypor hybrids (Hy) ( $\bar{x}$  = 84.48 kg and  $\bar{x}$  = 84.68 kg, respectively). Average shares of the muscle tissue for Hy and CCB pigs were 46.92 kg and 45.53 kg, respectively. Differences in meatiness between genotypes were highly significant ( $P < 0.01$ ). Imported genotypes (Hy) happened to have 1.39 kg i. e. 3.05 % more meat than Croatian genotype (CCB). Carcasses were evaluated according to (S)EUROP classes. In classes S and E came 50 % of the CCB pigs and 65.4 % of the Hy pigs. On the other hand, PSE and DFD meat as occurred more frequently in Hy genotype (PSE = 1.44, DFD = 3.6) than in CCB pigs (PSE = 0.00, DFD = 1.01). It was found that carcasses of Croatian Crossbreed pigs which had lower meatiness also had better quality of the muscle tissue than the Hypor pig carcasses with higher meatiness.

### Introduction

Croatian pig production, according to breeding program, has a creation of genotypes with high meatiness (over 60% of muscle tissue in the carcass) as the objective. Regarding the fact that average meatiness in Croatia is very low (44-46%), efforts to create genotypes which will have great yields of muscle tissue are quite understandable. Alas, selection of pigs for faster growth and bigger meatiness led to homeostasis disturbances followed by frequent disposition to stress and production of meat with poor technological characteristics. PSE and DFD meat are recognized as the special problem which occurs due to accelerated or decelerated processes of glycolysis post mortem. The aim of our research was to compare the meatiness of the carcasses with physical meat quality indicators of the Croatian genotypes in relation with the genotypes of imported pigs.

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### Material and Methods

Research was performed on the pig carcasses of the crossbreeds created from, according to Croatian national program Large White, Swedish Landrace and German Landrace (CCB =130) and Hypor hybrids (Hy = 90). Meatiness of the pig carcasses was determined by the Weniger et al. method (1963). comparison of the carcasses was conducted according the (S) EUROP classes. Qualitative characteristics of the meat were determined on the m. longissimus dorsi samples. After slaughtering, 45 minutes p.m., pH<sub>1</sub> value was measured. After 24 hours of cooling on + 4 °C, pH<sub>2</sub> value, water holding capacity (Grau and Hamm method) and the color of the meat (Göffo-device) was measured. Results of the research were processed by the statistical methods using MS Excel 5.0 program.

### Results and Discussion

Carcass mass was equalized in both of the pig genotypes, which was one of the prerequisites for defining the research (table 1.). Share of the muscle tissue in the carcass, determined by total dissection, depended on the genotype of the pigs. Carcasses of the imported genotypes (Hy) contained 1.39 kg, that is 1.64% more meat than Croatian genotype of the pigs (CCB). The difference between absolute and relative muscle tissue share was highly statistically significant (P < 0.01).

Valuation of the carcasses according to (S) EUROP classes is shown in the table 2. Analyzed genotypes of the pigs are grouped, due to the high yield of the meat, in classes (S) and E: 50% of the CCB pigs, and 65,4% of the Hy pigs.

Table 1. -MEATINESS OF PIG CARCASSES

Genotype	Carcass weight kg			Meatiness of carcasses			
	n	$\bar{x}$	s	kg		%	
				$\bar{x}$	s	$\bar{x}$	s
Croatian Crossbreeds	90	84.48	5.90	45.53	4.23	53.89	3.11
Hypor	130	84.68	6.98	46.92	5.05	55.53	2.65
Significance test		n.s.		**		**	

n.s. = non significant, \*\*P < 0.01

Table 2. - DISTRIBUTION OF PIG CARCASSES ACCORDING TO (S) EUROP STANDARD

Genotype		S	E	U	R	O	P	Total
Croatian Crossbreeds	n	4	41	33	12	-	-	90
	%	4.4	45.6	36.7	13.3	-	-	100.0
Hypor	n	6	79	43	2	-	-	130
	%	4.6	60.8	33.1	1.5	-	-	100.0

Table 3.- INDICATORS OF SOME QUALITATIVE MEAT PROPERTIES

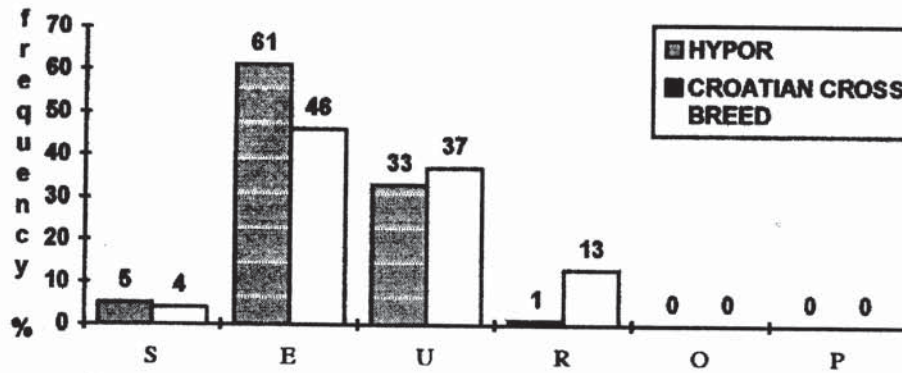
Indicator	Genotype				Significance test
	Croatian Crossbreeds		Hypor		
	$\bar{x}$	s	$\bar{x}$	s	
WHC cm <sup>2</sup>	7.91	1.61	8.07	1.52	n.s
pH <sub>1</sub>	6.28	0.32	6.09	0.24	**
pH <sub>2</sub>	5.79	0.16	5.74	0.20	**
Color Göfo	60.38	12.06	58.38	16.37	*

n.s. = non significant, \*P < 0.05, \*\* P < 0.01

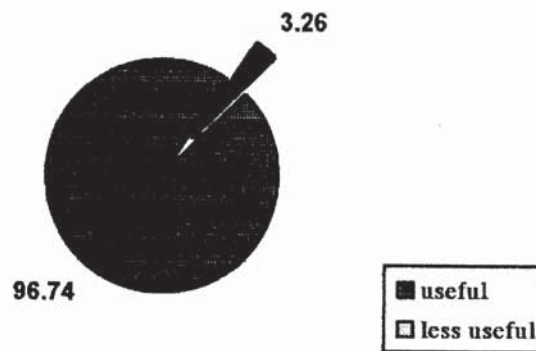
Tablica 4.- SHARE OF "USEFUL" AND "LESS USEFUL" MEAT WITH REGARD TO ITS pH<sub>1</sub> AND pH<sub>2</sub> VALUES

Genotype	"Useful"		"Lessuseful"		pH <sub>2</sub> ≥ 6.20 (DFD)	
	pH <sub>1</sub> ≥ 5.80,	pH <sub>1</sub> 5.61-5.79	pH <sub>1</sub> ≤ 5.60(PSE)	pH <sub>2</sub> < 6.00		
				pH <sub>2</sub> 6.01- 6.19		
Croatian Crossbreeds	96.74	3.26	0.00	93.48	5.43	1.01
Hypor	92.09	6.47	1.44	92.80	3.60	3.60

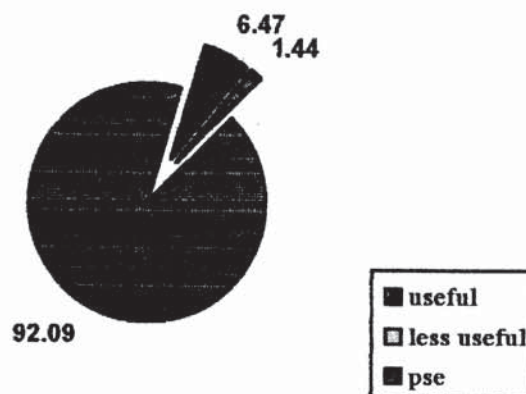
Quality traits of the muscle tissue are shown in table 3. Water holding capacity can not be related to genotypes of pigs ( $P > 0.05$ ). Figures shown are within the boundaries previously determined by Senčić (1993), Petričević et al. (1990), and Živković et al. (1992), so they can be considered acceptable from technological aspect. Significant differences are found between means of pH<sub>1</sub> and pH<sub>2</sub> considering the genotypes of the pigs. Lower pH values points at faster glycolysis flow in the muscles of the pigs. By the frequency analysis of the occurrence of pH<sub>1</sub> ≥ 5.80 it was identified 96.74 % of the CCB pigs, and 92.09 % of the Hy pigs (table 4). Applied proportion test shown that this can be attributed to the genotype ( $P < 0.01$ ). Meat unsuitable for processing occurred more frequently in Hy genotype than in CCB genotype of the pigs. Recommendations of Blendl et al. (1991) and Hofmann (1994) were accepted for the classification of the meat samples according to pH<sub>1</sub> and pH<sub>2</sub>. According to the last author mentioned above, less useful meat (PSE and DFD) can be used in the production of specific goods by addition of the suitable meat.



Graph 1. CARCASS FREQUENCY ACCORDING TO (S) EUROP CLASSIFICATION



Graph 2. SHARE OF USEFUL AND LESS USEFUL MEAT ACCORDING TO PH<sub>1</sub> VALUE (CCB)



Graph 3. SHARE OF USEFUL AND LESS USEFUL MEAT ACCORDING TO PH<sub>1</sub> VALUE (HY)

### Conclusion

On the basis of the research results the following conclusions can be derived:

Analyzed Croatian (CCB) and imported Hy) genotypes of pigs are characterized by high yield of muscle tissue in the carcass (CCB 53.89 %, Hy 55.53 %). Differences in meatiness among genotypes are highly significant ( $P < 0.01$ ).

- Occurrence of PSE and DFD as "less useful" meat was less expressed in Croatian than in imported genotype of pigs.

- Pig carcasses with lower meatiness have better qualitative traits of the muscle tissue than the carcasses with higher meatiness.

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### MESNATOST I KVALITATIVNA SVOJSTVA MESA HRVATSKIH KRIŽANACA I HYPOR SVINJA

#### Sažetak

Istraživanje je provedeno na 90 svinjskih polovica ( $\bar{x} = 84,48$  kg) podrijetlom od križanaca landrasa, nazvanih hrvatski križanci (CCB) te 130 polovica ( $\bar{x} = 84,88$  kg) Hypor hibrida (Hy). Udio mišićnog tkiva utvđen potpunim rasijecanjem iznosio je 43,53 kg kod Hypor svinja, dok je kod hrvatskih križanaca iznosio 45,53 kg. Razlika u mesnatosti između spomenutih genotipova bila je visoko statistički značajna ( $P < 0,01$ ). Svinje Hypor hibrida (Hy) imale su 1,39 kg tj. 3,05 % više mesa od hrvatskih križanaca (CCB). Svinjske polovice bile su rasvrstane po klasama prema (S)EUROP sustavu klasifikacije. U prve dvije klase (S i E) razvrstano je 50 % polovica hrvatskih križanaca (CCB) i 65,4 % polovica Hypor svinja (Hy). Pojava blijedog, mekanog i vodnjikavog mesa (BMV) te tamnog, suhog i čvrstog mesa češće se javljala kod Hy genotipa (BMV = 1,44, TCS = 3,60) nego kod CCB svinja (BMV = 0,00, TCS = 1,01). Utvrđeno je da su polovice hrvatskih križanaca s manjom mesnatošću imale bolju kakvoću mišićnog tkiva nego polovice Hypor svinja s većom mesnatošću.