SOME PARAMETERS OF NUTRITIVE VALUE OF PORK OF PUREBRED AND FOUR-RACE HYBRIDS

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Introduction

Meat is very important in balanced nutrition providing significant nutritive matters (proteins, fats), as well as biologically high-quality components (minerals and vitamins). The content of essential mineral matters and traces of mineral matters in meat depends on: kind and race of the animal, feeding, meat category and others (Falandysz, 1991; Leonhardt and Casper, 1997; Grujić et al., 2000).

Our previously presented investigations (Džinić et al., 2001) show that the increase of meat yield in swine halves, as the result of selection and crossbreeding, decreases the technological quality of meat even than when stress-sensitive heads are excluded from breeding.

The task of these investigations was to establish the effect of crossbreeding (hybridization) on content of certain parameters of nutritive value of meat, e.g. main nutritive materials (proteins, fats, mineral matters), as well as of some macro (K, Na, Mg, Ca, P) and trace elements (Cu, Zn, Fe, Mn), as well as to determine to what extent can the daily needs for these matters be satisfied by consuming 100 g of meat, in balanced nutrition of average addult.

Material and methods

Mm. semimembranosus was cut after dissection of cooled halves of purebred swines: Large Yorkshire (LY) and Swedish Landrace (SL), as well as from four-race hybrid (HxP)x(SLxLY), used for dissection according to EU procedure (1992), as described by Džinić et al. (Proc. 47th ICoMST). After the removal of outside muscle and connectivetissue, the muscles were homogenized and about 24hrs p.m. frozen at -25°C, and stored at the same temperature till the determination of chemical composition and content of macro and trace elements in the defrosted samples.

Chemical composition of investigated groups of muscles (content of water, proteins, fats and mineral matters) was determined by standard methods (AOAC, 1999).

Content of macro and trace elements, with the exception of P, was determined by atomic absorption spectrophotometry using Varian Specto AA-10, while P was determined spectrophotometrically (ISO, 1996).

The samples were prepared by dry ashing (Gorsuch, 1970).

Results and discussion

The obtained results are presented in 3 tables and 1 graph.

The lowest water content was found in muscles of LY race (75,54%), slightly higher in muscles of SL race (75,81%) and the lowest in muscles of pigs of hybrid pigs (HxP)x(SLxLY) (75,90%). The differences are statistically not significant (P>0,05). The content of proteins is opposite. Namely, the highest content was in LY pigs (21,99%) and the lowest in muscles of hybrids (21,52%). These differences are statistically not significant.

Table 1. Chemical composition of M. semimembranosus of investigated groups of pigs

Groups of pigs	Parameter	Components			
		Water g/100g	Proteins g/100g	Fat** g/100g	Min. matters g/100g
LY (n = 18)	x̄	75,74	21,99	0,98[b]	1,10
	Sd	0,69	0,74	0,37	0,04
	Cv	0,91	3,37	37,76	3,64
SL (n = 17)	x̄	75,81	21,64	1,34[a]	1,07
	Sd	0,67	0,80	0,36	0,02
	Cv	0,88	3,70	26,87	1,87
(H x P) x (SLxLY) (n = 7)	x̄	75,90	21,52	0,83[b]	1,10
	Sd	0,68	0,72	0,29	0,03
	Cv	0,90	3,35	34,94	2,73

**P < 0,01

The fat content is very low (Žlender, 1997) in all groups of investigated muscles, the lowest in muscles of hybrids (HxP)x(SLxLY) (0,83%), somewhat higher in muscles of SL race (0,98%) while muscles of SL race contained statistically higher content (P<0,01) of fat compared to other two investigated groups (1,34%).

The total content of mineral matters is almost identical in all three investigated groups of muscles.

Muscles of LY pigs (Table 2) contained statistically significantly (P < 0,05) higher amount of K (329,52 mg/100 g) than of SL pigs (280,61 mg/100 g) and muscles of hybrids (HxP)x(SLxLY) (288,52 mg/100 g). The highest Na content was determined in muscles of SL race (69,07 mg/100 g), then in muscles of hybrids (60,86 mg/100 g) and muscles of LY pigs (59,76 mg/100 g). However, the differences are statistically not significant (P>0,05). Similarily was stated for other macro-elements (Mg, Ca, P) e.g. the amounts determined in the investigated groups, though slightly different, are not statistically significant. The content of Ca and P, absolute amount, is somewhat higher and of Mg lower in the investigated groups of muscles than the ones cited by Rogowski (1981), citing a number of authors.

Table 2. Content of macroelements in M. semimembranosus of investigated groups

Groups of pigs	Parameter	K mg/100g	Na mg/100g	Mg mg/100g	Ca mg/100g	P mg/100g
LY (n = 18)	$\bar{x}$	329,52[a]	59,76	27,56	12,72	227,33
	Sd	23,73	14,14	1,46	2,12	17,06
	Cv	7,20	23,66	5,30	16,67	7,50
SL (n = 17)	$\bar{x}$	280,61[b]	69,07	27,27	11,60	237,50
	Sd	39,19	13,11	1,43	1,08	4,76
	Cv	13,97	18,98	5,24	9,31	2,00
(H x P) x (SlxLY) (n = 7)	$\bar{x}$	288,53[b]	60,86	26,42	11,55	229,50
	Sd	25,29	8,81	1,59	1,40	13,92
	Cv	8,77	14,48	6,02	12,12	6,07

The determined content of trace elements (Table 3) is lower (Mn, Zn, Fe) than the data presented by several authors for pork (Rogowski, 1981; Goldber, 1994), with the exception of Cu, since the determined amounts were higher in all three investigated groups of pigs, than the ones presented by the mentioned authors.

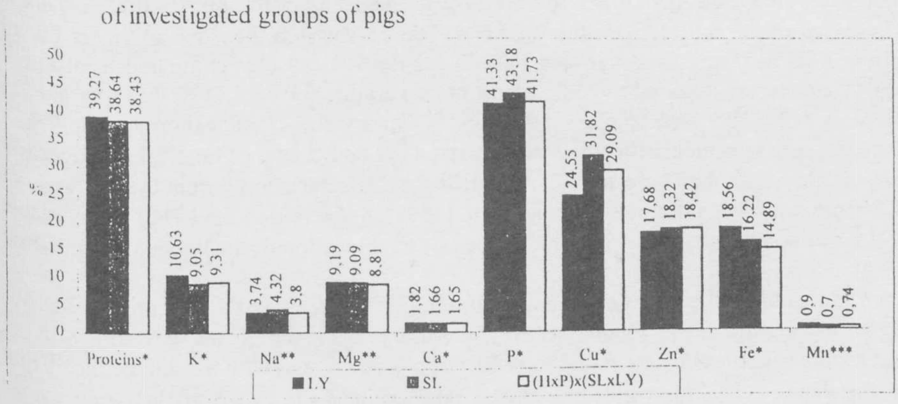
Iron (Fe) is very important in balanced nutrition (Žlender, 1997), so it has to be pointed out (Table 3) that the content of this trace element is lower in muscles of hybrids (HxP)x(SLxLY) (1,34 mg/100 g) than in muscles of pure-bred pigs LY and SL (1,67 mg/100 g and 1,46 mg/100 g, respectively). This finding could be related with the colour of those muscles (Džinić et al., 2001).

Table 3. Content of trace elements of M. semimembranosus

Groups of pigs	Parameter	Cu mg/100g	Zn mg/100g	Fe mg/100g	Mn µg/100g
LY (n = 18)	$\bar{x}$	59,76	27,56	227,33	329,52[a]
	Sd	14,14	1,46	17,06	23,73
	Cv	23,66	5,30	7,50	7,20
SL (n = 17)	$\bar{x}$	69,07	27,27	237,50	280,61[b]
	Sd	13,11	1,43	4,76	39,19
	Cv	18,98	5,24	2,00	13,97
(H x P) x (SL x LY) (n = 7)	$\bar{x}$	60,86	26,42	229,50	288,53[b]
	Sd	8,81	1,59	13,92	25,29
	Cv	14,48	6,02	6,07	8,77

On the bases of results presented in Graph 1, the trend of slight decrease of intake of certain nutritive matters with 100 g of meat of hybrid pigs (HxP)x(SLxLY): in proteins, K, Na, Mg, Ca, P, Cu and Fe. Though the importance of portion of muscle proteins in total proteins in daily intake is well known, it is important to point to the favorable ratio of Fe and Zn and Cu in muscles of all investigated groups, as well as to high satisfaction of human needs for these trace elements with 100 g of meat of the investigated groups of pigs (Sandsead, 1991).

Graph 1. Daily intake (%) in certain nutritive matters, consuming 100 g of meat of investigated groups of pigs



Source:
*Scientific Committee for Food. Nutrient and Energy Intakes for the European Community. Thirty-first series. Brussels: Directorate-General Industry, 1993. (RDA)
**Department of Health. Dietary reference values for food energy and nutrients for the United Kingdom. Report on health and social subjects: 41. London: HMSO, 1991. (RDA)
***Food and nutrition board. Recommended dietary allowances. 10th edition. Wachington DC: National Academy of Sciences, 1989. (RDI)

Conclusion

The meat yield increase in halves of pigs, achieved by breeding of 4 races of pigs (hybridization) resulted in slight decrease of nutritive value of meat (content of proteins, Mg, Ca, Fe) but statistically not significant (P>0,05). The decrease of fat content in these muscles is statistically significant (P<0,01) compared to content in muscles of purebred pigs.

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