POSITION DATA OF PORK FROM A NEW GENOTYPE BRED NATURALLY AS COMPARED TO THE PORK FROM LARGE SCALE FARMING

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mary

A new pig genotype of Hungarian Big White (75 %) and mangalica (pigs with curly bristles, 25 %) was bred then the pigs were kept in a small farming system, with all possibilities of a natural lifestyle. They did receive either antibiotics or yield increasing hormones. The pigs were sacrified at a bodyweight of 160 kg so.

Control pigs of genotype Hungarian Big White were kept in a large-scale farming and sacrified at 100-120 kg bodyweight. The two groups (12 animals each) received practically the same feed.

Lipid peroxidation characterized by the malondialdehyde level was significantly decreased in the spare rib, and ham samples of the new genotype. Superoxide dismutase activity, referring to the enzymic defence against free radicals, was much higher in the hams and chops of new genotype than in the control samples.

Iron and zinc levels were much higher in the pork samples of the new genotype. In this group an increase of tamin concentration could be observed, too.

There was no marked difference in the protein and fat content between the samples of the two pig groups.

Research work is in progress to find the reason for the differences in the composition data.

oduction

There is a need in the modern societies to consume foods free from additives, colourants, pesticide sidues, hormones and toxic chemicals. These raw materials produced by a "natural" way are called organic ods.

Our aim was to develop a new pig genotype that is suitable for the rough keeping, conditions resistant to genous infections. As a result of a breeding experiment, the pig genotype of Hungarian Big White (75 %) and galica (pig with curly bristles 25 %) proved to be the best one.

The pigs were kept in a small, isolated farming system, with all possibilities of a natural lifestyle. Feed posed of soy protein with mixed mineral and vitamin supplementation was given by the usual way. The feed tained pesticide residues under the limit and it was absolutely free from antibiotics, sulfonamides and owth stimulating hormones. Unusually this genotype was kept until attaining the average bodyweight of 160 kgs order to gain pork after sloughtering with qualified organoleptic characteristics.

The aim of our investigations was to determine the composition of various nutrients and some representative ameters of the lipid peroxidation and the enzymic defence from the well defined parts of body. Only very few rmations are available about the nutrients of pigs kept in natural circumstances. From our earlier vestigations it was pointed out that large-scale farming promotes the "in vivo" lipid peroxidation in pigs DVORSCHÁK, PROHÁSZKA 1986, LUGASI et al. 1992).

Control pigs of genotype Hungarian Big White were kept in a large-scale farming and were sacrified at the ual 100-120 kg of bodyweight. This group received practically the same feed as the other genotype.

terials and Methods

After sacrifying the two pig groups (12 animals each), spare ribs, chops, hams and livers were separated rom each animal, and the analitical determinations were carried out from these parts of body.

The meat and liver samples were minced two times in a mincer, then mixed with tenfold amounts of buffer olution. Homogenization took 5 minutes using a homogenizer.

Malondialdehyde (MDA) was assayed photometrically with the thiobarbituric acid reagent in meat and l homogenizates after an ascorbic acid induction (OHKAWA et al.).

From the free radical protecting enzymes superoxide dismutase (SOD) activity was determined by inhibition of adrenaline autooxidation in meat and liver homogenizates after a centrifugation with a speed 600 g (SUN, ZIGMAN).

Thiamin and riboflavin content was determined by a HPLC technique (BARNA).

Iron and zinc level of the samples was determined after dry ashing and acid treatment by flame ato absorption method (PERKIN ELMER).

Results and Discussion

Ther was no significant difference in the protein, water and fat content between the two groups, so t results are not introduced.

Thiamin and riboflavin results are shown on Table 1. Except the liver samples the porks of new genot have higher thiamin levels compared to the controls, but the differences are not significant statistically. riboflavin contents are practically the same in both groups.

Table 2, refers to the iron and zinc concentrations of the pork and liver samples. In the group of genotype the level of these microelements elevated significantly as compared to the control group. Beside great differences, the concentrations in this kind of pork are higher than in the well-known European composition tables (for example: SOUCI - FACHMANN - KRAUT).

Table 1.

	Thiamin /ug/100 g		Riboflavin /ug/100 g	
	New genotype	Control	New genotype	Control
Spare rib	475 ± 152	390 ± 148	111 ± 41	95 ± 30
Chop	448 ± 199	395 ± 164	82 ± 19	99 ± 36
Ham	486 ± 184	420 ± 196	90 ± 39	100 ± 28
Liver	226 ± 44	268 ± 93	1960 ± 290	2033 ± 360

Table 2.

	Zn /ug/g		Fe /ug/g	
	New genotype	Control	New genotype	Control
Spare rib	$42,0 \pm 14^{x}$	25,1 ± 20	15,8 ± 3,7	11,5 ± 6,6
Chop	$35,0 \pm 21^{xxx}$	12,7 ± 5,8	$14,9 \pm 4,9^{xxxx}$	8,1 ± 2,2
Ham	$39,4 \pm 17,7^{xxx}$	18,2 ± 8,7	$14,1 \pm 3,2^{xx}$	10,2 ± 2,3
Liver	92,4 ± 24	43,0 ± 20	162,5 ± 41	124 ± 30

$^{x}p < 5$ %

$^{xx}p < 1$ %

$^{xxx}p < 0,2$ %

$^{xxxx}p < 0,1$ %

Table 3. shows the MDA contents and the SOD activities, referring to the parameters of lipid peroxidation the animal tissues. MDA levels were significantly lower in the pork of the new genotype. In the liver, ham chop samples of the new genotype the SOD activity was higher than in the control, referring a more active defence system. As some microelements are ingredients of SOD (e.g.: Zn) the higher activity corresponds the higher microelement concentrations in the new genotype samples.

Table 3.

	Malondialdehyde (MDA) nM/100 g		Superoxide dismutase (SOD) (U/mg prot.)	
	New genotype	Control	New genotype	Control
rare rib	6,4 ± 17^{xxx}	13,6 ± 3,9	7,4 ± 1,5	6,5 ± 2,5
hop	4,4 ± 2,0^{xxx}	10,8 ± 2,2	8,2 ± 2,2^{x}	5,5 ± 1,5
am	6,6 ± 2,7^{xxx}	12,0 ± 2,5	11,1 ± 3,1^{xxx}	6,0 ± 0,6
iver	49,8 ± 12	58,6 ± 13	16,9 ± 2,0	13,0 ± 1,0

$^{x}p < 1\ \%$

$^{xxx}p < 0,1\ \%$

nclusion

In natural circumstances bred, fattened to a high bodyweight pig genotype proved to have a better composition than the pigs kept in a large-scale farming and cut at 100-120 kg of bodyweight. This difference refers to the following parameters:

- a trend of a higher thiamin concentration;
- significantly higher level in Zn and Fe;
- a resistance against the reaction of lipid peroxidation.

Further experiments are needed to answer the question, whether the new genotype, or the natural lifestyle the higher bodyweight are responsible for the favourable composition.

ferences

ARNA É: 1992. Thiamin and riboflavin determination in meats by HPLC technique. Élelmezési Ipar (in press)

WORSCHÁK E., PROHÁSZKA L.: 1986. The effect of improper feeding on the lipid peroxidation of meat animals. Z. ERNAHRUNGSWISS. 25. 96-102.

AGASI A., DWORSCHÁK E., ENYINGI T., GERGELY A., ZSINKA Á.: 1992. Effect of the deprivation of mineral and vitamin supplement on free radical reactions in pigs. Z. Ernährungswiss. (in press).

AKAWA H., OHISHI N., YAGI K.: 1979. Assay for lipid peroxides in animal tissues by thiobarbituric acid reaction Anal. Biochem. 95. 351-358.

TKIN ELMER Analytical Methods for Atomic Absorption Spectrophotometry. Norwalk, Connecticut, USA, 1971.

OLCI S. W., FACHMANN W., KRAUT H. 1986/87. "Food Composition and Nutrition Tables". Wissenschaftliche Verlagsgesellschaft mbH, Stuttgart 1031 p.

UN M., ZIGMAN S.: 1978. An improved spectrophotometric assay for superoxide dismutase based on epinephrine autooxidation. Anal. Biochem. 90. 81-83.