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ANALYSIS OF MEAT QUALITY FROM MANGALITSA BREED

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Abstract

The Mangalitsa breed is known as being one of the most popular breeds from Europe, having excellent properties regarding the taste, the marbling and the very reduced amount of cholesterol.

In the last years, more information about meat quality has become available and especially about the fat of Mangalitsa pigs from Romania, according to which their meat is also very suitable for obtaining dried products and for the popular grill. Also, this breed has become popular in Spain, Switzerland, Austria and Germany. In this study, meat and fat quality were examined for 22 Mangalitsa pigs. Compared to the German Saddlepack breed, also considered fat, the German Landrace breed has the meat darker in color, the fat is whiter and intramuscular fat content in meat and the backfat thickness are considerably higher.

The high amount of intramuscular fat and its fine and equal dispersion are favorable in terms of palatability (flavor, juiciness and tenderness) and overall, it is considered an excellent quality.

• Introduction

In the past, consumers preferred well marbled meat, the one rich in intramuscular fat, which was particularly important in the preparation of steak in Anglo-Saxon areas. The effects of intramuscular fat on meat quality are to reduce dripping and cooking losses, improve doneness and juiciness. Deliberate breeding work, which began in the 1960s, has yielded spectacular results in increasing the lean meat content of pigs. This has led to the elimination from breeding of pig breeds with lower reproductive rates, slower growth and poorer feed conversion.

However, selection for increased amounts of colored meat has been associated with changes in muscle fiber types in pork, an increase in the proportion of glycolytic muscle fibers and in the average muscle fiber diameter, which contributes to the development of PSE trait. And on the other hand, intramuscular fat content decreased to such an extent that it already had a negative effect on the organoleptic properties and taste value of the meat.

• Material and method

In this experiment, a total of 12 Mangalitsa fattening pigs with an average live weight of 155 kg (carcass weight of 127 kg) were slaughtered. The fattening pigs were fed a mixed grain-based feed (maize, wheat, barley) supplemented with potatoes (winter) and green fodder (summer) depending on the season. During the routine slaughtering of the pigs, in addition to measuring the data required for certification, the thickness of the back fat, the pH value (pH, pH) in the long flesh, the color of the meat and back fat were measured.

The color measurements (long-pulp, bacon) were carried out with a Minolta CR 200. Samples were taken from the musculus longissimus dorsi (musculus longissimus dorsi, abbreviated m.l.d.) between ribs 11 and 12 for determination of the chemical composition and fatty acids.

The samples for analysis were transported frozen to the research institute. After thawing, the intramuscular fat content was determined by Soxhlet extraction procedure, and the fatty acid composition of the muscle samples was determined after extraction(Chloroform/Methanol) by saponification and esterification by gas chromatography according to Nürnberg et al. (2001).

The results were evaluated by comparing the data from the Mangalitsa breed with those from German Belted and German Flat pigs with similar fat level. These breeds were slaughtered at 110 kg live weight after intensive fattening (mixed grain-based feed).

Conclusions

Our results confirm the information in the literature that the quality of Mangalitsa pig meat differs in several respects (intramuscular fat content in the meat, meat color, thickness of the fat, color of the fat) from the quality of meat of widely used breeds and hybrids. The high intramuscular fat content (7,5 - 9,04) and its fine and even distribution in the meat have a positive effect on palatability, tenderness and taste, not least in the production of roasts and special products (ham, salami).

Mangalitsa pork ham has a high hardness (stearic acid content: 9,71- 13,05%) and a favorable fatty acid composition (PUFA: 12,49- 15,54%), which makes it an excellent choice to produce high quality and high value ham.

In general, our results show that Mangalitsa pigs are suitable to produce traditional products with high added value and specific qualities. The future of the breed largely depends on how we can secure a long-term market for these products.

• Results and discussions

The meat quality parameters for the pig breeds studied are summarized in **Table 1**. When evaluating the results, it should be noted that Mangalitsa fattening pigs were slaughtered at a higher live weight, as indicated by the difference in carcass weight of about 43-45 kg. The data in **Table 2** show that the quality characteristics of Mangalitsa meat obtained by video image analysis are close to those of beef cattle breeds with meat with excellent 'roasting' characteristics, e.g. high intramuscular fat content, higher proportion and number of fat areas and favorable fat area distribution, i.e. uniform and fine penetration of fat meat.

Table 1. Evolution of meat quality parameters

Parameter	Mangalitsa	German Belted Pork	German Flatfish
Slaughter weight, kg	124	85,9	84,6
pH,m.l.d.	5,7	5,8	5,8
Color m.l.d., L	37,9	47,9	46,7
Bacon color, L	75,3	73	73
Bacon thickness, cm	5,7	3,6	2,3
Intramuscular fat m.l.d., %	7,7	2,5	1,2

Table 2. Analysis of intramuscular fat deposition (marbling) of the longissimus dorsi (m.l.d.) using video image analysis

Parameter	Mangalitsa	Wagyu	German Angus	Galloway	Black and colored	Belgian White and Blue
Cross sectional area m.l.d, cm	36,2	76,9	111,0	92,9	85,9	146,9
Fat areas, cm	5,2	11,9	1,5	1,2	1,2	1,0
Number of fat areas	414	439	419	619	537	169
Percentage of fat areas, %	13,9	14,2	5,9	8,9	7,9	1,3
Number of fat areas/cm	12,1	5,5	3,8	6,5	6,0	1,2
Fat areas distribution, %	7,4	4,1	5,6	4,3	5,5	9,7
Intramuscular fat	8,9	21	3,5	5,3	4,7	0,7

Optimal intramuscular fat content and uniform and fine fat loading and distribution in the meat are important from a human nutrition point of view, but they are not the only characteristics of desirable meat quality. Equally important is the fatty acid composition of the meat, the favorable development of which has a positive effect on the incidence of cardiovascular disease and cancer.

The fatty acid composition of the long lobe fatty acids (L.L.D.) of the three breeds of pigs that have been studied is shown in **Table 3**. Monogastric animal species, e.g. on pigs, diet significantly influences the fatty acid composition of different body tissues. Therefore, the data in **Table 3** should be interpreted in the light of the fact that the two German breeds were fat-fed on a mixed cereal-based feed, whereas Mangalitsa pigs were also fed green fodder, potatoes, during fattening.

Table 3. Fatty acid composition of the longissimus dorsi muscle m.l.d %

Parameter	Mangalitsa	German Saddleback	German Landrace
Intramuscular fat, %	7,5	2,6	1,1
Fatty acids, %			
Myristic acid C 14:0	1,40	1,10	1,03
Palmitic acid C 16:0	22,40	24,69	23,46
Palmitoleic acid C 16:1	5,80	2,68	2,60
Margaric acid C 17:0	0,06	0,15	0,26
Heptadecenoic acid C 17:1	0,14	0,15	0,19
Stearic acid C 18:0	7,00	14,15	12,23
Oleic acid C 18:1 cis-9	49,20	42,20	39,20
Octadecanoic acid C 18:1 cis-11	6,50	3,98	4,00
Octadecanoic acid C 18:1 trans-11	0,20	-	-
Linoleic acid C 18:2 n-6 cis	3,67	6,20	9,90
Linolenic acid C 18:3 n-3	0,17	0,30	0,40
Arahic acid C 20:0	0,10	0,24	0,21
Eicosanoic acid C 20:1 n-6	0,94	0,80	0,75
Eicosatrienoic acid C 20:3 n-6	0,14	0,29	0,40
Arahidonic acid C 20:4 n-6	1,16	1,29	2,40
Eicosapentaenoic acid C 20:5 n-3	0,01	0,07	0,19
Docosapentaenoic acid C 22:5 n-3	0,14	-	-
Polyunsaturated fatty acids PUFA	5,61	8,30	14,00
Saturated fatty acids SFA	31,03	40,50	37,20
Unsaturated fatty acids UFA	68,97	59,50	62,80
n-3 fatty acids	0,35	0,35	0,74
n-6 fatty acids	4,97	8,00	13,30
n-6/n-3 ratio	14,2	22,8	17,9

