THE COMPARATIVE STUDY ON THE QUALITY CHARACTERISTICS OF DOMESTIC PORK MEAT AND WILD BOAR MEAT

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Abstract

Meat and meat products represent a valuable source of protein with high biological value, due their content in all essential amino acids which are found in an optimum ratio. The wild boar meat and the products processed by its have a high quality. In this paper we present the results of a study aimed to assess by comparison the physical, chemical and microbiological characteristics of the wild and domestic meat. The experimental results obtained for moisture was 78.3% for domestic pork meat and 70.9% for wild boar meat respectively. The pH of wild boar meat was nearly one neutral (6.8) while the pH of the domestic pork meat was more acidic (5.8). Regarding the fat content the wild boar meat it was found to be twice lower as fat than the domestic pork meat. Also, the registered values of protein content was in the range of 19.2% (for domestic pork meat) – 20.5% (for wild boar meat). In terms of number of coagulase-positive staphylococcus and of the total number of coliforms it was noticed that the domestic pork meat had a lower number of germs than the one in wild boar meat. The obtained results are according to literature data and lead to conclusion that the meat of the wild boar is more valuable in terms of nutritive properties than that of domestic pork.

Key words: meat, pork, wild boar, fat, protein

It is known that the consumers want to introduce in their diet, meat coming from other than domestic animal species. One of the arguments for consuming venison is due to consumer desire to diversify their daily menu by introducing special dishes in it consisting of foods rich in nutrients and not least with superior sensory properties (Rywotycki R., 2003; Soriano A. *et al*, 2006; Vergara H. *et a*l, 2003). The main attributes of wild animal meat that make it superior to that of domestic animal include their livelihood in welfare, having unlimited access to natural pastures away from human settlements pollution. The mentioned living conditions induce the chemical composition of venison, which is distinguished by its high content of macro- and microelements, optimal ratio between polyunsaturated and saturated fatty acids, lower caloric value, and also by a specific smell and taste (Szczepański J. et al, 2007a,b). There are informations which indicate that the domestic pig has taken its rise in ~9000 years ago from Eurasian wild boar independent from wild boar subspecies in Europe (*Sus scrofa scrofa*) and Asia (*Sus scrofa vittatus*) (Giuffra E. *et al*, 2000). Differences in physiochemical characteristics between meat from wild boars and domestic pigs consist in a higher pH, dark colour and lower conductivity of the wild boar meat as against to the pig (Kasprzyk A. *et al,* 2010). The fatty acids composition is influenced by the animal diet. Thus palmitic (16:0), stearic (18:0), oleic (18:1 cis–9) and linoleic (18:2 n−6) acids were the most abundant fatty acids in wild boar meat (Razmaitė V. et al, 2012). Several studies has reported that the moisture and fat content were lower and protein higher in meat from hunted wild boars compared to domestic pigs (Żmijewski T., 2001). Meat from wild boars presents a significantly lower content of sodium, and higher contents of iron, manganese, phosphorus and zinc compared to pork (Sales J., 2013). Microbiological characteristics of venison meat depend on: types of microorganisms on the digestive tract and muscles of animals; the way in which animals are killed; and the grooming of carcase conditions. Also, the bacteriological charge could be influenced by the storage conditions and biochemical properties of the meat (Gill C. O., 2007). European legislation does not established specific microbiological criteria for venison meat and microbiological quality of wild boars is generally considered as to be similar to that of domestic pigs. The possible differences among species could be atributed to differences in hunting

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and/or handling methods, being independent of the time periods between killing, evisceration and sampling (Membré J., 2011). Taking into consideration the aforesaid, we present in this work some physical and chemical characteristics of meat from wild boar and pork.

MATERIAL AND METHOD

The samples were collected from quadriceps femoris muscle both in case of wild boar and pork, in the winter hunting season, right after the hunting and immediately after slaughter, respectively. 500g from each of sample was taken of after the evisceration of animals. The samples were kept for 24 hours on 4ºC, and then they were frozen and were stored in refrigerator until the carrying out laboratory tests. Moisture, protein and fat contents were measured in accordance with the methods reported by AOAC (1990, 1995). The humidity was determined by drying oven method by drying of 5g samples at 105ºC, until a constant mass. pH was determined using a pH-meter Mettler Toledo™ FiveEasy™ Plus FP20 pH/mV Meters. Determination of raw protein content was performed using the Kjeldahl-method, using 1g of minced sample which was mineralized in 20mL sulfuric acid, 98%. The obtained mineralization was distilled in the presence of boric acid 01.N and sodium hidroxid 30%. The distillate was titrated with sulfuric acid 0.1N. Determination of fat content was performed by Soxhlet extraction method using petroleum ether as solvent. In terms of microbiological characteristics we determined the colonies number of coagulase-positive staphylococci and total coliforms, respectively. In order to determine the colonies number of coagulase-positive staphyloccocs we proceeded to inoculate 1 ml sample on a selective Chapman medium which were incubated at 37ºC for 48 hours. The total coliforms were determined by inoculation of 1 cm^3 sample on a Levine medium which were incubated at 37^0C for 48 hours in order to distinguish *Escherichia coli* and *Enterobacter* bacteria and to identify the *Candida albicans*.

RESULTS AND DISCUTIONS

In order to compare the physical and chemical characteristics of wild boar meat and pork meat we assessed the pH, moisture, total proteins and fat content of these (*table 1*).

Table 1

Physical and chemical characteristics for wild boar meat and pork meat

Physical and chemical characteristic	Meat from pork	Meat from wild boar
pH	5.8±0.29	6.8±0.29
Moisture (%)	78.3±1.52	70.9±1.25
Protein (%)	19.2±0.85	20.5±1.05
Fat (%)	4.0±0.18	2.0±0.11

According to previously performed study the pH value registred experimental for wild boar meat was 6.8 while the pH value determined for pork meat was 5.8 (Marchiori A. F., 2003). The meat sample taken from wild boars shown a higher pH value than of the meat sample excised prom pork meat.

It was noticed that the meat sample from pork was slightly higher in comparison to meat sample from wild boar.

The results obtained in this study, presented in *table 1*, are according with previously obtained data for moisture content in pork meat, which had almost 5% higher content of humidity than wild boar meat (Szczepański *et al*, 2007).

As it was reported in several other studies, wild boars shown a higher fat level in meat than pork meat.

Our experimental results highlighted that the wild boar meat was twice lower as fat than the domestic pork meat (*table 1*). It is known that usually venison meat is considered as more dietetic, mostly due its fewer amounts of lipids than domestic animals. But this tendency is not observed during autumn-winter season, when meat is fattier, because of the fact that animals consume more fodder in order to gain weight for winter (Szmańko T. *et al*, 2007). A similar fat content in meat from pork was reported by Szczepański et al (2007). The special sensory properties of wild boar meat can be atributed the total lack of marbling, bacause the fat was not visible in the microstructure of muscle tissue. This observation can be explained by the fact that fat was limited to a very narrow clusters or a very small cells. This leads to the conclusion that the venison meat has higher tenderness and juiciness (Szmańko T. *et al*, 2007).

The experimental values determined for crude protein (*table 1*) content reveal that the

protein content of wild boar meat is 7% higher than the pork. Our study results were according with the data published by Szczepański et al [2007] for protein content in pork meat. Other authors noticed that wild animals were able to produce meat with higher protein content (23.91%), which confirmed that meat from wild animals contains more protein.

Microbiological contamination of meat represent maybe the most important quality characteristic of food, including culinary meat. The main goal of this study was to compare the quality of meat from traditional hunting with meat from domestic animals which is obtained in accordance with the industry slaughter procedure, respecting the rules of very high hygienic standards, including HACCP system. The experimental results obtained for coagulase-positive staphyloccocs and total coliforms are presented in *figure 1*.

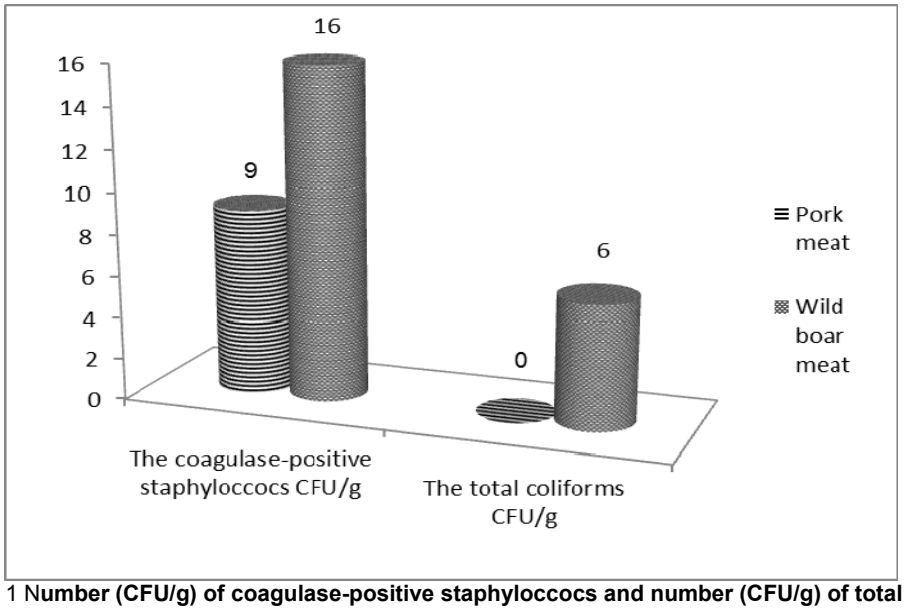

Figure 1 N**umber (CFU/g) of coagulase-positive staphyloccocs and number (CFU/g) of total coliforms of the meat from wild boar and pork**

As is shown in *figure 1*, in the venison meat was determined a higher microbiological contamination than in the pork meat, both in terms of coagulase-positive staphyloccocs and total coliforms. It must be mentioned that in case of meat from pork, we did not find any coliforms bacteria. Nevertheless, the level of contamination with both bacteria, coagulase-positive staphyloccocs and total coliforms, was not danger and is reach and are within the limits of legislation regarding the meat from pork. European legislation does not yet established specific limits for microbiological parameters in venison meat. According to Decastelli *et al* (1995) microbiological contamination of wild boar carcasses is dependent on slaughter conditions, and it ranges from 10^5 to 10^8 cfu/g or from 10^3 to 10^6 cfu/g.

CONCLUSIONS

Result recorded in the study show, that meat from wild boars, in terms of physico-chemical parameters as moisture, protein in fat content, has a higher quality in comparison to meat from domestic pigs. The most valuable quality characteristics of wild boar meat were high protein content, low quantity of fat and the resistance to microbiological contaminations which might confer an optimal nutritional profile of the finished products.

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