RESEARCH ON THE PHYSICO-CHEMICAL PROPERTIES OF PORK MEAT FROM THE MANGALITSA BREED, ORIGINATING FROM DIFFERENT VARIETIES RAISED IN THE MOLDOVA REGION

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Abstract

Mangalilsa is one of the old-type breeds, formed several centuries ago by crossing primitive European and Asian pigs. This breed was introduced to Romania from Serbia in the 19th century, being specialized for fat production. In our country, the Mangalitsa pig breed was exploited until the 1950s, after which the number of pigs of this breed drastically decreased due to the growth of breeds and hybrids with high productive performance, as well as changes in the population's consumption habits. This study presents a series of data obtained from the analysis of the physico-chemical properties of pork meat from the Mangalitsa breed, originating from different varieties raised in the NE area of the country. The biological material used for this study consisted of pigs from the Mangalitsa breed, originating from 3 different varieties, namely the blonde variety, the red variety, and the swallow-belly variety.

Key words*: physico-chemical properties, Mangalitsa breed, variety*

INTRODUCTION

Mangalitsa is one of the old-type breeds, formed a few centuries ago by crossbreeding primitive European and Asian pigs. The Mangalitsa pig breed was introduced to Romania from Serbia in the 19th century [1, 5].

This breed of swine is specialized for fat production, with a carcass fat percentage of approximately 70%. It was exploited in our country until the 1950s, after which the numbers of this breed decreased significantly due to the rise of breeds and hybrids with much better productive performance, the emergence of modern pig farms, and changes in the population's consumption habits [2, 3, 4].

Regardless of the color variety, Mangalitsa pigs have a carcass meat percentage of less than 40% [10, 11].

The meat of this pig breed is characterized by a favorable ratio of saturated and unsaturated fatty acids, with a low cholesterol content, lower than that of vegetable margarine.

The quality of pork can be assessed through a series of determinations of its chemical, physical, and organoleptic properties. Pork is a general term that includes muscle and adipose tissues along with other tissues (bones, skin, internal organs) [7].

Determining the chemical composition of pork is very important for the composition of the products that will be obtained from its processing. Pork has a relatively constant chemical composition, very close to that of muscle tissue, but the chemical composition of fatty pork can vary greatly.

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MATERIAL AND METHOD

The biological material necessary for this work was represented by the herd of pigs of the Mangalitsa breed, raised on a livestock farm in the NE part of Romania, a type A farm specialized in the breeding, reproduction, and exploitation of pigs of this breed.

In this case, the biological material was represented by specimens of pigs from the Mangalitsa breed, blonde, red, and swallow-bellied varieties.

To achieve the purpose of this research, three experimental groups of Mangalitsa pigs were formed from the studied biological material, consisting of 10 individuals each, castrated males and females from the blonde, red, and swallow-bellied varieties. In the unit where the research was carried out, a semi-free range system is applied, with the pigs being fed concentrated feed and having permanent access to pasture. The individuals from the three experimental groups, which were the subject of this study, were slaughtered in a specialized pig slaughterhouse at the age of approximately one year and a body weight exceeding 100 kg.

The determination of the average body weight at slaughter of the biological material was done within the slaughterhouse, prior to the slaughtering process.

To determine the physico-chemical properties of the pork from the Mangalitsa breed, samples were taken from three distinct body regions (neck, thigh, and loin), which were subjected to high-precision analyses using the methodology in force for these determinations.

The determination of the pH of the pork was done in accordance with the national standards in force [12, 13].

The pH of the meat influences its quality from an organoleptic, hygienic, and technological point of view, thus a gradual decrease to a value of about 5.4 can cause the meat to lighten in color, while a sudden decrease in pH causes a pale pink hue, specific to exudative meat, commonly found in pigs.

In terms of chemical composition, pork consists of the following components: water, nitrogenous substances (proteic and non-proteic), lipids, carbohydrates, enzymes, vitamins, and mineral substances.

The determination of moisture in the analyzed samples was done according to ISO 1442:2010 standard [14].

The water and dry matter content of pork can vary quite a lot, depending on the type of meat, breed, sex, and age of the pigs at slaughter, the fattening state, the applied breeding system, the feed provided to the pigs, and the anatomical region.

The determination of the protein content in Mangalitsa pork was done in accordance with SR ISO 937:2007 standard [16].

The protein content of pork can be influenced by the fattening state of the pigs, the moisture content of the meat, the breed, sex, the age of the animal at slaughter, and the type of meat.

The determination of the lipid content in Mangaliţa pork was done in accordance with SR ISO 1444:2008 standard [15].

The lipid content in pork can vary greatly, depending on the type of meat, the water content of the meat, the breed and age of the animal, and especially the fattening state.

The physico-chemical properties of Mangalitsa pork were determined on samples of thigh, loin, and neck collected from 10 carcasses from each of the three varieties of Mangaliţa pigs studied (blonde, red, and swallow-bellied varieties).

The laboratory analyses performed allowed the determination of the pH, water content, dry matter, protein, and lipid content of the pork.

RESULTS AND DISCUSSIONS

To achieve good slaughter yields and superior physico-chemical and organoleptic properties of the meat, the Mangalitsa pigs

in the research unit are slaughtered at live weights exceeding 100 kg, thus obtaining a higher percentage of fat in the carcass. The average slaughter weight varied between 106.50±1.45 kg, recorded for the red variety pigs, and 111.30±1.28 kg, recorded for the swallow-bellied variety pigs, according to the data presented in Table 1.

Table 1. Average slaughter weight of Mangalitsa pigs

Lot	n	Sex	Live Weight X ± sx (kg)
Mangalitsa blonde variety	10	♀+♂	108,31±1,21
Mangalitsa red variety	10	♀+♂	106,50±1,45
Mangalitsa swallow-bellied variety	10	♀+♂	111,30±1,28

The determination of the pH in the Mangalitsa meat samples was carried out in a specialized laboratory 24 hours after the pigs were slaughtered, according to current standards. The determinations were made on samples taken from the ham, neck, and loin, for the three varieties of Mangalitsa pigs.

The pH values recorded 24 hours after slaughter are presented in Table 2 and ranged between 5.79±0.02 and 5.83±0.03 for neck samples, between 5.73±0.03 and 5.78±0.02 for ham samples, and between 5.74±0.04 and 5.79±0.03 for loin samples.

Table 2. pH values of Mangalitsa pork

Lot	n	Sex	pH X ± sx		
			Neck	Leg	Loin
Mangalitsa blonde variety	10	♀+♂	5,79±0,02	5,73±0,03	5,75±0,03
Mangalitsa red variety	10	♀+♂	5,80±0,03	5,75±0,03	5,74±0,04
Mangalitsa swallow-bellied variety	10	♀+♂	5,83±0,02	5,78±0,02	5,79±0,03

The evolution of the pH of pork immediately after slaughter is of particular importance because the pH of the meat directly influences its organoleptic properties and its water retention capacity, as well as the suitability of the meat for preservation and processing.

Regarding the content of Mangalitsa meat in substance, the average values obtained are presented in Table 3.

Table 3. The Dry Matter Content of Mangaliț a Pork

Lot	n	Sex	S.U. (%) X ± sx		
			Neck	Leg	Loin
Mangalitsa blonde variety	10	♀+♂	40,89±0,51	30,12±0,37	31,47±0,40
Mangalitsa red variety	10	♀+♂	42,23±0,35	30,74±0,48	33,19±0,54
Mangalitsa swallow-bellied variety	10	♀+♂	44,12±0,32	33,10±0,46	32,24±0,38

The dry matter content of Mangalitsa meat, from pigs in the three experimental groups, varied depending on the anatomical region. Thus, the lowest values were recorded in the ham and ranged between 30.12% and 33.10%, while the highest values were recorded in the ham, ranging between 40.89% and 44.12%.

Comparing the average values obtained for dry matter in the three anatomical regions studied, we can conclude that the lowest values were recorded in the Mangalitsa blonde variety pigs.

Regarding the protein content of the pork samples studied, it varied depending on the anatomical region analyzed. The lowest values were recorded in the neck, ranging between 14.84% in the blonde variety and 16.17% in the swallow-belly variety (Table 4).

Table 4. Protein content of Mangalitsa pork

Lot	n	Sex	Protein (%) X ± sx		
			Neck	Leg	Loin
Mangalitsa blonde variety	10	♀+♂	14,84±0,21	19,62±0,30	18,77±0,41
Mangalitsa red variety	10	♀+♂	15,03±0,27	20,85±0,33	20,38±0,33
Mangalitsa swallow-bellied variety	10	♀+♂	16,17±0,24	20,75±0,21	19,97±0,39

For the pork loin, the average protein content values ranged between 18.77% and 20.38%, with the lowest values obtained in the blonde variety.

Regarding the protein content of Mangalitsa ham, it can be observed that the recorded values were around 20%, with limits ranging between 19.62% in the blonde variety and 20.85% in the red variety.

The lipid content of Mangalitsa pork varied within fairly wide limits, with the lowest average values ranging between 8.79±0.21% and 9.32±0.33% recorded in the ham, and the highest values ranging between 24.36±0.37% and 26.11±0.29% recorded in the neck (Table 5).

Table 5. Lipid content of Mangalitsa pork

Lot	n	Sex	Lipide (%) X ± sx		
			Neck	Leg	Loin
Mangalitsa blonde variety	10	♀+♂	26,11±0,29	9,32±0,33	13,07±0,18
Mangalitsa red variety	10	♀+♂	25,42±0,23	8,79±0,21	12,25±0,14
Mangalitsa swallow-bellied variety	10	♀+♂	24,36±0,37	8,98±0,26	12,44±0,28

The lipid content of Mangalitsa meat varied within fairly wide limits, depending both on the variety of Mangalitsa pigs studied and especially on the type of anatomical region, with the neck of Mangalitsa presenting a higher lipid content in all cases.

CONCLUSIONS

The pH values of Mangalitsa meat determined 24 hours post-slaughter were similar for all three anatomical regions, ranging between 5.73% and 5.83%.

Comparing the average values obtained for dry matter, it can be observed that the lowest values were recorded in the group consisting of Mangalitsa blonde variety pigs.

The protein content of the Mangalitsa meat samples studied varied depending on the anatomical region analyzed, with the lowest values recorded in the neck, ranging between 14.84% in the blonde variety and 16.17% in the swallow-belly variety.

Regarding the lipid content of Mangalitsa meat, it varied within fairly wide limits, both depending on the variety of Mangalitsa pigs and especially on the type of meat, with the neck of Mangalitsa presenting the highest values.

The average values obtained from the determination of the physico-chemical properties of Mangalitsa pork were within the optimal range for this breed of pigs, being close to those found in the specialized literature [5, 6, 8, 9, 11].

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