CHEMICAL AND MICROBIOLOGICAL EXAMENING OF FINAL MEAT PRODUCTS AS AN INDICATOR OF THEIR QUALITY

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ABSTRACT

The study shows the results from a chemical and microbiological examining of certain meat products produced from different types of pork meat (tenderloin - pork chop, ham, and collar) by a meat processing company from Republic of Macedonia. We have examined 10 pieces of tenderloin - pork chops, 10 pieces of pork ham and 10 pieces of pork collar.

The pork tenderloin contained in average 71.72% of water, 28.88% of proteins, 5.98% of fat and 1.00% of minerals. The pork ham contained in average 70.32% of water, 20.99% of proteins, 4.95% of fat and 1.10% of minerals. The pork collar contained in average 70.22% of water, 20.58% of proteins, 4.72% of fat and 1.10% of minerals. The total number of bacteria was 270 for the pork ham, 320 for the pork tenderloin and 220 for the pork collar.

Key words: tenderloin, ham, collar

INTRODUCTION

The Meat Industry and Slaughterhouse a factory for processing of meat and meat products, has a tradition of 50 years. Following the world's achievements in production technologies and ensuring the quality of its products, it had implemented ISO 9001:2000 in 2003 and HACCP food safety system in 2005.

The quality of the finished meat products (Tea Sausage, Meat Luncheon, Beef Goulash, Smoked Pork Collar etc.) produced by Meat Industry and Slaughterhouse Sveti Nikole, Republic of Macedonia is regularly monitored by microbiological, chemical and organoleptic analysis of the meat products.

The mathematical-statistical analysis is important for interpreting the results achieved. The most important and most commonly used method is the standard deviation[1]. As smaller the standard deviation that much smaller is the variability of the statistical group. The standard deviation along with the mean value determines whether the distribution of the statistical sum is normal[2]. Another important method of statistical analysis is the variation coefficient. It is used to compare variability of two or more characteristics, i.e. the same characteristic measured in different terms.

This study gives preliminary results of the statistical processing of the chemical analysis of the meat products. The aim of this of this study is to show the condition of the quality of few chosen products (Tea Sausage, Meat Luncheon, Beef Goulash and Smoked Pork Collar) through chemical analysis and determining their quality variability and rank of quality.

MATERIAL AND METHODS

Four meat products were chosen to be examined: Smoked Pork Collar, Meat Luncheon, Beef Goulash and Tea Sausage. During the production of these products, starting from the primary preparation and slaughtering of the animals and all through the final production of the mentioned products, all sanitary veterinarian measures for slaughtering and primary processing of meat and meat products that are official in the country had been preserved. From all these products results were collected in 10 repeated measurements of water, fat, proteins, minerals, nitrite and kitchen salt.

The quantity of the water in the products is determined by drying to a constant weight at a temperature of 105°C[3]. To determine the quantity of fats in the final products we used the standard method based on extraction of fats by organic dissolvents in a Soxlead apparatus[3, 4]. The quantity

of proteins was determined by the method of Kjeldahl[5]. The quantity of ashes (mineral materials) was determined by measuring the quantity of ashes in the samples after mineralization in a Muffle Oven at a temperature of 550-650°C[6].

The quantity of nitrites was examined by a method based on the creation of a yellow colour compound after the reaction of 20 ml of 0.1 H p-p of silver nitrate with 20 ml of nitric acid and 1 ml of color inducing solution (reactant by Zambeli) with ammonia. The intensity of the color is measured by a spectrophotometer at wave longitude of 439 nano meters[7].

The quantity of kitchen salt was determined by treatment of 5 gr of the sample with 20 ml of 0,1 H solution of silver nitrate and 20 ml of nitric acid placed on a gas ring for its destruction. A satiated solution of potassium permanganate and sugar is then added till the solution becomes colorless. A 100 ml of distilled water is then added and a phero-ammonium sulphate indicator, and then it is titrated with 0,1 H solution of ammonium rodanide[7].

The achieved results were mathematically and statistically processed by a standard computer program Excel under defined statistical methods (ANOVA Exel 1997-2003) . We determined the mean values, standard deviation, variation coefficient and the presence of statistically important differences by the criteria of Duncan and Newman-Keuls[8, 9].

RESULTS AND DISCUSSION

The measured quantities of water and fat in the final products are shown in Picture 1 respectedly. The quantities of water in the pork chop vary from minimum of 69,72,% to maximum of 75,29% giving an avarage value of 71,72%, while in the Hamm vary from minimum of 69,50,% to maximum of 75,48% giving an avarage value of 70,32%, and in the Collar range from 68,82% to 77,20% with an average of 70,22%. The quantities of fat in the porckchop range from 4,32% to 6,72% giving an avarage value 5,98%, while in the Ham vary from 4,32% to 6,28% giving an avarage value of 4,95%, and in the Collar vary from 3,50% to 6,78% with an average of 4,72%.

The measured quantities of proteins and minerals in the final products are shown in Picture 2 respectedly. The quantities of protein in the porkchop give an avarage of 28,88%, in the Ham give an avarage of 20,99, and in thecollar give an average of 20,58,%. The quantities of minerals in the Porkchop give an avarage of 0,1%, in the Ham give an avarage of 0,9%, and in the Collar an average of 1,10%.
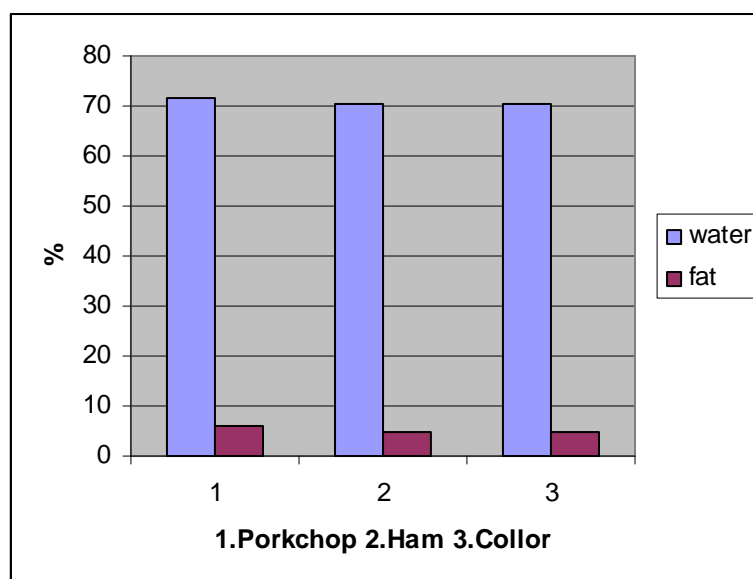
Picture 2. – Average of the results from chemical analysis of water fat in porkchopt hamm collar,

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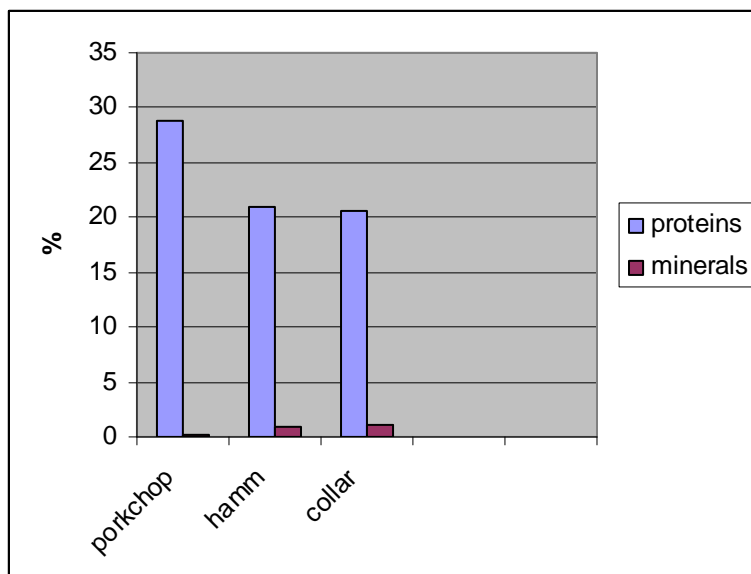
Picture 2. – Average of the results from chemical analysis of minerals (ashes) in protein in porkchopt hamm collar,
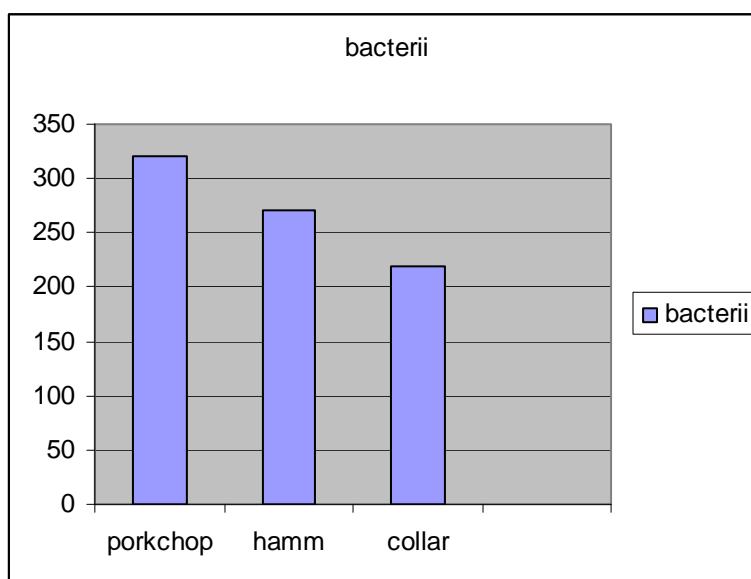
Picture 3. Total number of bacteria in porkchop, ham collar

From the graph number 3 show that most bacteria in a porkchop and most in collar.

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	16,1888	3	5,396267	0,004658	0,999524	4,066181
Within Groups	9267,842	8	1158,48			
Total	9284,031	11				

Table 1. Results of statistical analysis of data

From the   statistical results (data analysis) Anova (Ehel1997-2003)showed that there are significant difference between groups p>0,05.

CONCLUSIONS

From the above mentioned we could draw the following conclusions: The pork tenderloin contained in average 71.72% of water, 28.88% of proteins, 5.98% of fat and 1.00% of minerals. The pork ham contained in average 70.32% of water, 20.99% of proteins, 4.95% of fat and 1.10% of minerals. The pork collar contained in average 70.22% of water, 20.58% of proteins, 4.72% of fat and 1.10% of minerals. The total number of bacteria was 270 for the pork ham, 320 for the pork tenderloin and 220 for the pork collar.

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