EXPERIMENTAL RESEARCH ON VENISON PRODUCTS' QUALITY

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Abstract: The venison products, the cold meats and other meat products have appeared lately both on european and romanian market. The venison products are considered delicacies being primarily recommended to people who have blood pressure, liver or cholesterol health problems. The aim of this study was to determine the venison products' quality and the venison cold cuts' quality by conducting series of physico chemical and sensory assays on the product: moisture determination, sodium chloride determination, easily hydrolysable nitrogen determination, determination of nitrates and nitrites, collagen content determination, total mineral substances determination and the determination of sensory properties. The microbiological analyzes have revealed the microbial load of the end product: Coliform Bacteria, Escherichia Coli, Salmonella Spp., Staphylococcus, Sulphite-Reducing Clostridia, Bacillus Cereus. The product is full conformity with national and European regulations on the contaminants mentioned above.

Keywords: venison sausages, quality, energy value, innocuity

Introduction

The venison is considered a delicacy in Romania. There are several preservation methods for the venison, including: salting, freezing and smoking. For the manufacture of smoked sausage made of mixture of deer and wild boar meat the chosen preservation method is smoking.

Smoking is not only used for its role in preserving the meat and the meat products, but also for its role in conferring a specific taste, which in combination with the meat flavour and the spices results in a very good taste. (1), (2) The smoke can be produced both indoors and outdoors. The latter method is performed in dry climate areas and this process does not resort to burning wood. During meat processing, the smoke must meet certain criteria in order to obtain tasty and healthy food. The specific flavour of smoked products is obtained after the combination of smoke components with the meat and the spices. If the meat smoking is carried for a too short a time, a "green" taste will occur, somewhat crude, which will resemble with the taste of fresh meat after the smoke removal. To those types of products, the flavour resulting from the maturation process will be absent. If the meat smoking is carried for a too long time, the meat will have a pungent taste and smell, instead of a pleasant natural aroma. The tarry taste is given by the use of improper burning material. Such products have a bitter to acid taste, the undesirable flavour being derived from the organic acids in the smoke composition. The acquirement of the desired colour of meat products depends directly on the type of meat, the used smoking technique and its duration. (3)

A study which aimed to determine the influence of gutting and maturation practices of quarry carcasses on sensory, physicochemical and microbiological properties was conducted on a group of 18 animals which were differently slaughtered, gutted and ripened. 6 carcasses were immediately skinned and ripened after evisceration for 24 hours. 6 of them were ripened unskinned for 24 hours and 6 of them were ripened

unskinned for 72 hours at 10°C. The maturation method had an significant effect on the sensory properties of the quarry, and the unskinned ripened carcasses had an intense taste and smell. The carcasses which were ripened for 72 hours had a dark colour meat with an increased number of aerobic bacteria. Therefore, the gutting type and the ripening period of the quarry carcasses have a significant importance, influencing the carcass quality. (4), (5)

The recent increase in natural populations of wild boar has stimulated the interest in this species as meat producer. Compared with domestic pigs, wild boars show a higher level of fat in the carcass. The differences between wild boars' meat and domestic pigs' meat could consist in the cooked meat flavour and fatty acid composition. The greater concentrations in α-tocopherol in the wild boars' meat could extend the shelf life of venison. (6)

In order to contribute to the use of venison as delicacy there were conducted studies regarding the proteolysis and physico-chemical composition in fatty acids of 10 types of dry commercial sausages, Chorizos and Saucissons, made of deer meat and wild boar meat. The a_w and pH values were similar for all samples. However, certain results showed great variation between the tested samples: total dry matter, protein, fat, ash, sodium chloride, and phosphorus and sodium nitrite content. The myofibrillar protein content was higher than the sarcoplasmic protein content in all analyzed samples. The profiles of sarcoplasmic and myofibrillar proteins were determined by electrophoresis, resulting different values for each sample. The most present fatty acids in the samples were: oleic, palmitic, linolenic and stearic acids. Chorizos differ from Saucissons ($p<0.05$) due to the higher content of polyunsaturated fatty acids. (7)

Other studies have made reference to innocuity of wild boar meat stored for up to 21 days at 0°C, 7°C or 15°C temperatures.

NTG gradually grew with the increasing of the storage temperatures, so at 15°C the storage was acceptable just for 7 days and at lower temperatures the venison could be maintained for more than 15 days in good microbiological and hygiene conditions. (8)

Materials and methods

Materials

The end product, smoked sausages made of venison (wild boar and deer), of trade, were studied in terms of quality by applying the following analytical methods: moisture determination, determination of sodium chloride, easily hydrolysable nitrogen determination and determination of nitrates. On the microbiological load there were carried out tests for Coliform Bacteria, Escherichia Coli, Salmonella Spp., Staphylococci, Sulphite-Reducing Clostridia, Bacillus Cereus. Knowing the fact that the end product, namely wild boar and deer sausages, are more dietary than those made of beef or pork, the energy value per 100 grams product was calculated according to the manufacturing recipe. (13), (14)

Methods

Moisture determination is made according to SR 9036/3-73 for several purposes, namely: assessment of the product's nutritional value, conservation power assessment, verification of declared humidity etc. The principle of the method consists in the exposure of the working sample to a heat source up to a constant weight. According to

the heating source and the nature of the used equipment, the method has several variants: stove drying, distillation with solvents by using electrohygrometers, by chemical methods, infrared drying. (9)

Sodium chloride determination is made according to SR 9065-5-73 and its main objective is the quality control of the product. The principle of the method lies in the titration of chloride ions from the weakly alkaline extract with silver nitrate in the presence of potassium chromate as indicator. (10)

Determination of easily hydrolysable nitrogen, in the form of ammonia, is made according to SR 9065-7:2007 by releasing it through the medium of a weak base, by means of water vapours and its capture in an acidic solution, which is titrated with a sodium hydroxide solution. (11)

Determination of nitrites by the Kriess method. In an acidic medium the nitrites may be combined with a primary aromatic amine in order to form a diazonium salt. If this salt is fused or coupled with another primary aromatic amine, a colored complex is formed, which is submited to Beer law. The intensity of the analyzed solution's color is compared to that of a standard solution containing a known amount of nitrite. The reading can be directly performed, visually, using a comparison scale or by the instrumentality of a photo colorimeter or a spectrophotometer using a standard curve. It is recommended that the proteins from the aqueous extract to be removed by precipitation and filtration for an accurate assessment.

Quantitative determination of proteins - Kjeldahl method - developed in 1883 by Johann Kjeldahl.

The method principle: The analyzed product decomposes in constituent elements, in hot medium, in the presence of sulfuric acid and a catalyst: C, H, O, P, Fe. Following the proteins' decomposition and the decomposition of other nitrogen compounds there are released the ammonium ions, which are combined with sulfuric acid to form ammonium bisulfate. The ammonium bisulfate releases the ammonia, which is distilled and collected in an acidic solution. Knowing the amount of acid required to neutralize the distilled ammonia it is possible to calculate the amount of nitrogen in the analysed sample. The method does not measure directly the protein content, it uses a conversion factor F = 6.25 (at most proteins, the nitrogen ratio is approximately 16%). F varies dependent on the amino acid sequence specific to each protein.

The organoleptic examination aims to establish the quality of meat and by-products directly or through comparison with a standard product based on sensory impressions and some examiners. The organoleptic properties assessment, in addition to the fact that it determines the product quality, it can give information regarding to the necessity of its laboratory research.

First it is conducted the organoleptic examination of the product's exterior and then on its section. There are established the general appearance, color, consistency, smell and taste (12).

Results and discussion

Organoleptic properties

Venison sausages are smoked products, seasoned with pepper and garlic. The composition is introduced in thin pork intestines. During filling there are formed pieces of 15-18 cm by twisting and they are hot smoked after a preliminary drying.

Appearance: stick with compact mass, with no foreign bodies, no adhesiveness.

Color: pink-reddish throughout the mass, mosaic.

Taste and smell: pleasant unpungent garlic smell and taste, specific for meat products. No foreign taste and smell.

Chemical an dmicrobiological properties

In figure 1, there are presented the chemical properties of venison sausages: moisture, lipids, NaCl, $NaNO_2$, and in the table 1 the microbiological properties.

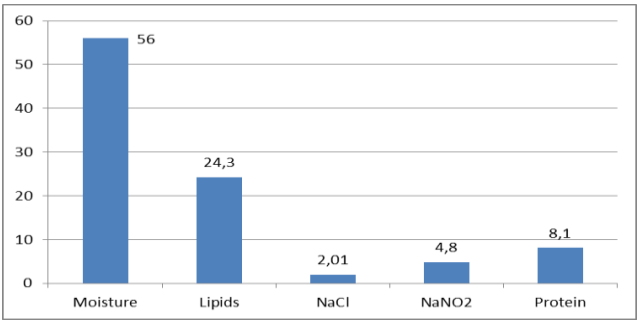

Fig. 1. Chemical properties of venison sausages

Table 1. Microbiological properties of smoked venison sausages

Microorganisms	**u.f.c./g**
Coliform Bacteria	maximum 100/g
Escherichia Coli	maximum 10/g
Salmonella Spp.	absent 25/g
Staphylococcus	10/g
Sulphite-Reducing Clostridia	maximum 100/g
Bacillus Cereus	maximum 10/g

Preservation and transport conditions, according to law

4-6 days under optimal storage conditions at temperature of maximum 12-16°C and relative humidity of 75-80%.

Smoked venison sausages are transported and stored at temperatures between 12°C and 16°C and 75-80% humidity. The storage is made by hooking on sticks, the specific loading being between 50-100 kg/m^3. The deposits must be cooled with wall mounted batteries.

Energy value determination

In figure 2 there is presented the protein, lipid and carbohydrate content per 100 g of venison's components.

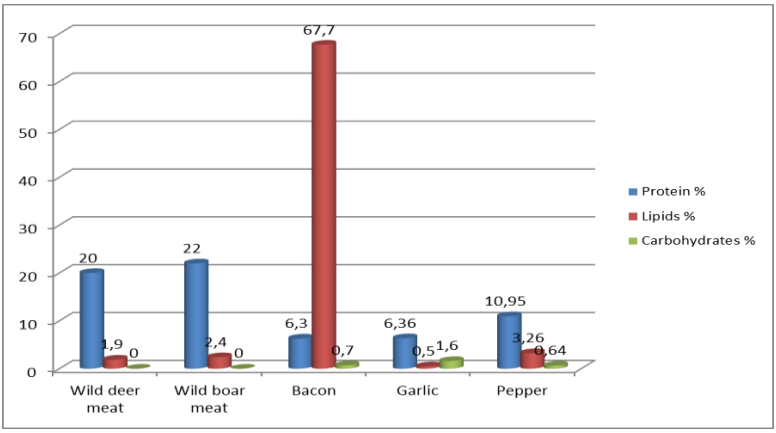

Fig. 2. Chemical composition in proteins, lipids and carbohydrates of raw and auxiliary materials used in the preparation of venison sausages

In figure 2, the proteins, lipids and carbohydrates are calculated for the quantity of raw and auxiliary materials, in total 97.7 g, used to obtain smoked venison sausages.

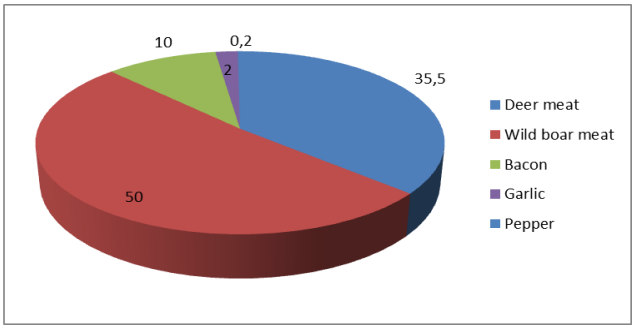

Fig. 3. The amount, in grams, of raw and auxiliary materials, total 97.7 g, used for venison sausages preparation

Following the calculation, 97.7 g raw and auxiliary materials will contain: 18,8791 g proteins, 8.66102 g lipids and 0,10328 g carbohydrates.

Knowing that by the combustion of 1g carbohydrates there results 4.1 kcalories, 1 g proteins = 4,1 kcal and 1g lipids = 9.3 kcal, the energy intake brought by the consumption of 100 g sausages made from wild boar meat and deer meat was calculated.

$$Total\frac{kcal}{97.7g} = 18.8791 * 4.1 + 0.10328 * 4.1 + 8.66102 * 9.3 =$$
$$= 77.40431 + 0.454432 + 80.547486 = 158.406228\ kcal/97.7g$$

The energy value, depending on this composition, will be of 162.43 kcal/100g venison sausages.

Given the very low lipid content in the venison composition and the very low quantity of bacon which is added in venison sausages, their energy value is very small.

Conclusions

In optimum technological process conditions and using good quality raw and auxiliary materials, the end product is within the normal law limits regarding the chemical composition, salt and nitrites addition, and the microbial load does not exceed the legal limits. The results of the study pointed out the physico-chemical and microbiological quality of the venison sausages (made of deer and wild boar meat).

The essential characteristics of the end product show the low energy value, amounting to 162.43 kcal/100g product, being considered a product with a lower calorific value compared to the products made of pork or beef meat.

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