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THE CHANGES OF CHARACTERISTICS OF THE PORK WHOLE MUSCLE MEAT PRODUCTS WHILE USING THE ELECTROLYZED WATER

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Annotation. This article describes the influence of electrolysed water on yield and organoleptic properties of the pig whole muscle meat products. The relation of desiccation during the thermal treatment depending on type of binary mixture of electrolysed water fractions in brine was established. The changes of organoleptic properties (taste, flavour, color, appearance, sectional view) of the exploratory prototypes of the whole muscle meat products were indicated. The practical importance of the salt solutions usage based on electrolysed water for producing of gourmet whole muscle meat products was noted. It was experimentally proved that the electrolysed water usage for brine allows to increase the product yield from 3.8 to 7.3% in comparison with the control samples. The recommendations according to the usage of binary mixtures of electroactive water fractions for salt solutions preparation were provided.

Keywords: meat, gourmet meat, organoleptic indicators, yield, catholyte, anolyte, brine.

ЗМІНА ХАРАКТЕРИСТИК ЦІЛЬНОМ'ЯЗОВИХ ВИРОБІВ ІЗ СВИНИНИ ПРИ ВИКОРИСТАННІ ЕЛЕКТРОАКТИВОВАНОЇ ВОДИ

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Анотація. У статті показано вплив електроактивованої води на вихід та органолептичні властивості цільном'язових виробів із свинини. Встановлено залежність втрат вологи при термічному обробленні від виду бінарної суміші фракцій електроактивованої води у розсолі. Показано зміни органолептичних показників (смак, аромат, колір, зовнішній вигляд та вигляд на розрізі) дослідних зразків цільном'язових виробів. Відзначено практичне значення використання розсолів на основі електроактивованої води для виробництва цільном'язових виробів делікатесної групи. Експериментально доведено, що використання електроактивованої води для приготування розсолу дозволяє підвищити вихід готових продуктів від на 3,8 – 7,3 % у порівнянні з контрольними зразками. Наведено рекомендації щодо використання бінарних сумішей фракцій електроактивованої води для приготування розсолів.

Ключові слова: м'ясо, делікатеси м'ясні, органолептичні показники, вихід, католіт, аноліт, розсіл.



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Introduction. Statement of the problem

Meat products delicatessen group have a number of consumer advantages, among other products. The most important are the specificity of taste and aroma and high nutritional value. The formation of the most of the organoleptic characteristics of these products is at the stage of salting. But the quality of the raw materials and their functional and technological properties greatly affect not only the organoleptic properties, but also on the economic efficiency of production of such products [1-6].

The development of new technologies of production of whole muscle meat products involves the use of multicomponent brines with the introduction of functional additives that allow directionally regulate the functional and technological properties of raw meat. One of the directions of stabilization of quality characteristics of the finished products and the directed regulation of properties of meat raw materials is the use of activated brines [3,4,6-8].

Literature review

Raw meat is a multicomponent system containing chemical compounds and elements of different classes. These compounds are subjected to a large number of transformations during the industrial processing, which cause specific organoleptic properties of the finished products. At the stage of preparation of raw meat it is important to determine the intensity level and type of technological treatment to achieve the required characteristics of the finished product. Production technology of whole muscle meat products directly depends on the initial functional and technological characteristics of raw materials for their production [1,3-9].

At the stage of salting whole muscle products are formed most of the qualitative characteristics of the product. The most popular is the wet salting method of extrusion. Such salting allows to intensify the technological process and to more evenly distribute brine components. The composition of the brines often in-

cludes pH regulators, flavor enhancers and functional additives to ensure high product yield [1,5,8-14].

The quality of water for the brine plays important role in the formation of organoleptic characteristics of the finished delicacy products. Various techniques, for example boiling, reduce rigidity through the use of water softeners, installing a filter system on the production, chlorination of water, etc. are used to improve water quality. There are alternative ways to clean and improve water quality for use in the meat industry. One of those ways is electroactivating of drinking tap water [7,8,15-17].

Electroactivated water produced by unipolartreatment by drinking water under the influence of electric current of high voltage. Two fractions of water – anolyte and catholyte are the products of such processing. The anolyte is acidic fraction of water with pH = 2 – 3 and a redox potential of +1200 mV. The anolyte exhibits the properties of oxidizer, antibacterial properties. Catholyte – an alkaline fraction of water with pH = 10,0 – 11,2 and redox potential minus 700 mV. Catholyte behaves as a good solvent, alkaliner, the reducing agent [15-17].

The changes of characteristics of the pork whole muscle meat products while using the electrolyzed water

Products from whole muscle pork is a popular meat product along with sausages.

Taking into consideration the results of the research of sausage products with electroactivated water [18], we decided to use this water in the production technology of cut products of pork. There were selected the most significant indicators, namely: organoleptic evaluation of samples wholemuscle products and moisture loss during heat treatment.

Technology of production of whole-muscle pork products provides for the introduction of water into the product in the form of brine by the method of ex-

trusion. Given this, for the model samples were prepared with brines based on electroactivated water.

The studied samples of brines are compiled on the basis electroactivated water with the ratio of the catholyte/anolyte – 10/90, 40/60, 50/50, 70/30, 90/10. The brine control sample was prepared on the basis of drinking tap water. The brine was injected into whole-muscle products in the amount of 25 % by weight of raw meat.

To produce the finished samples of whole muscle cooked products of pork we have taken the recipe "Ham boiled best state" for the similarity of the brine recipes on the recipe of brine for model samples whole muscle pork products.

The trimmed meat was ground into pieces weighing 100±5 g and extrusion brine. The amount of the brine was 40 % by weight of raw materials. Springvale composition of brine: water – 89 %; salt – 10 %; sodium nitrite – (2.5 % solution) 1 %. Massing was performed at a rotation frequency of 16 rpm. for 12 hours in a cycle: rotation – 20 min, sucks – 20 min. After massaging the raw material is kept for 12 hours to ripening.

Prepared raw material is subjected to shaping and heat treatment according to standard mode. The end of cooking was determined by reaching the center of the product temperature (71±1) °C.

One of the most important aspects of the production of whole-muscle pork products are the output of the finished product. Also the product yield is one of the main criteria for economic assessment of production of meat products. Through the processes occurring during heat treatment, the yield of finished products is significantly reduced due to the loss of mass.

The results determine the impact of water on electroactive loss of moisture during thermal processing of whole muscle pork products are shown in Fig. 1.

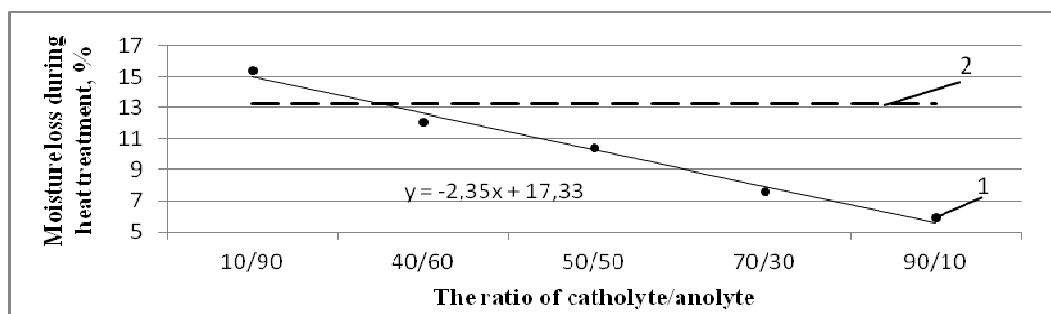


Fig. 1. The Influence of the electroactivated water on moisture loss during heat treatment samples of pork whole muscle cooked products: 1 - prototypes, 2 – the control.

The use of brines on the basis of binary mixtures of fractions electroactivated water in the range of 50/50 – 90/10 reduces moisture loss during thermal processing of 3.8 – 7.3 percent (Fig. 1). This effect is explained by stronger ties of the brine based on water electroactive with proteins of muscle tissue due to the

displacement of the active acidity in the alkaline direction. This result correlates with the findings in the study of model systems of minced meat [18].

When conducting organoleptic evaluation of prototypes the following results were obtained. Appearance freshly prepared samples cut products of pork

with the brine based on binary mixtures of fractions electroactivated water differed from the control sample with the water, that was noted with the corresponding estimates. The appearance of samples has remained virtually unchanged during their storage. However, on day 7 it was noted surface mucoson of the control sample and deterioration of the appearance of products with the ratio of alkaline and acidic fractions electroactivated water 90/10.

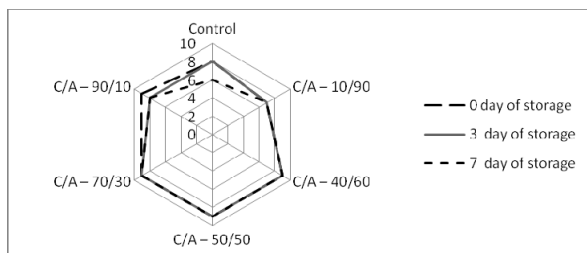


Fig. 2. The appearance of whole muscle pork products with electroactivated water

When cut, whole muscle products electroactivated water was satisfactory, except for samples with a high content of acidic fraction (Fig. 3). This is due to some reduction in ability to bind moisture of the meat, which, in its turn, led to the loosening of the structure of the meat. During storage, significant deterioration of this indicator in the experimental samples was not observed. The consistency of the products remained soft throughout the shelf life of samples with the ratio of catholyte/anolyte 40/60 – 70/30. The sample with the ratio of catholyte/anolyte 10/90 has been some loosening of the structure.

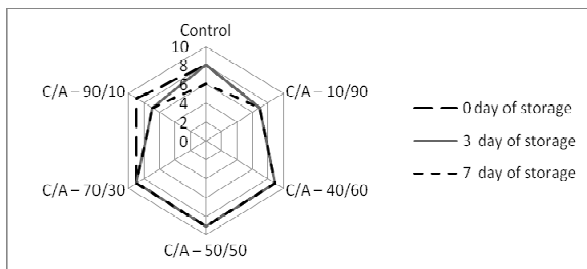


Fig. 3. When cut, whole muscle pork products with electroactivated water

Samples' taste of whole-muscle products with a ratio of catholyte/anolyte 90/10 had an alkaline taste, and with a ratio of 10/90 it had bold acid flavor. When storing data samples, this characteristic remained unchanged. It is worth noting that in all samples from the studied water marked pleasant taste of boiled meat. But during the storage process the control sample have lost the intensity of the taste compared to the prototypes, despite the relatively high taste characteristics.

During the entire period of storage the taste of the control sample had deteriorated, this is likely due to the initial stages of spoilage of the specimen, it was

noted by the corresponding value (Fig. 4). The taste of all samples deteriorated a little after 7 days of storage.

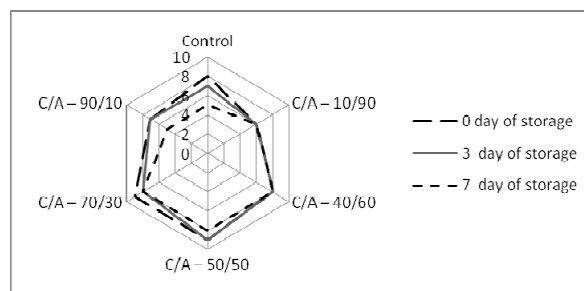


Fig. 4 Taste of whole muscle pork products with electroactivated water

The pink color of the products was observed, that is peculiar for this type of products (Fig. 5). The control sample had a more pale color compared to the color of the experimental samples, as the sample with the ratio of catholyte/anolyte 10/90. Probably, it happened because of the shift of pH to the acid side, which impairs the formation of color processes. A more vivid color of all the other prototypes should be noted. This is due to the positive influence of water electroactive processes on the formation of color processes.

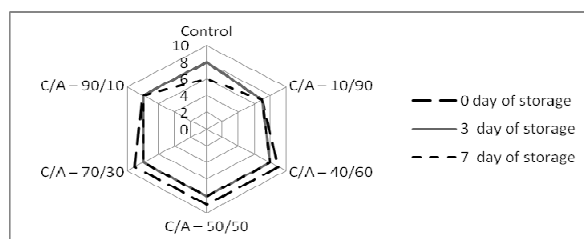


Fig. 5. Color of whole-muscle pork products with electroactivated water

The aroma of the product is pleasant and typical for boiled meat. However, the sample with a high content of the catholyte (90/10) was noted as such with a slight alkaline aroma, and respectively the sample with a high content of acidic fraction (10/90) had a light sour aroma. During storage the aroma gradually deteriorated in all samples, it was noted by the corresponding estimates (Fig. 6).

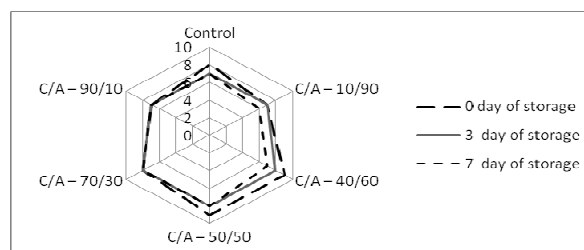


Fig. 6. The aroma of cut products of pork with electroactivated water

Thus, the best organoleptic indicators have samples with a ratio of catholyte/anolyte from 40/60 to 70/30. The sample with the ratio C/A 10/90 has some

loosening of the structure, the weaker color, sour aroma and taste. Alkaline flavor and aroma, intense bright color, elastic structure is found in the sample with the C/A ratio of 90/10.

Sensory evaluation of experimental samples cut products of pork has confirmed the feasibility of using electroactive water in certain ratios in the technology of delicatessen products. It is found improved organoleptic properties of experimental specimens with electroactivated water, that are stable during storage.

Conclusion

It is established that the applying of the catholyte/anolyte ratio from 40/60 to 70/30 allows to reduce the loss of moisture of whole-muscle products of pork on 4 – 5.6 %, the overall use of electroactivated water in the range from 10/90 to 90/10 allows to re-

duce the loss of moisture by 3.8 – 7.3 percent. Appearance designs with electroactivated water in the range 70/30 – 40/60 marked the highest rating and remained virtually unchanged during the storage of samples. Appearance whole-muscle products cut with electroactivated water was satisfactory, except for samples with a high content of acidic fractions. The taste and aroma of the prototypes were pleasant, typical of boiled meat, but the samples with the 90/10 catholyte/anolyte ratio had peculiar alkaline flavor and aroma, and the samples with the 10/90 catholyte/anolyte ratio had a sour ones. The color of samples is brighter and more resistant when they are storing with a greater proportion of catholyte. It is found the positive influence of electroactivated water on prototypesis shelf life.

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ИЗМЕНЕНИЕ ХАРАКТЕРИСТИК ЦЕЛЬНОМЫШЕЧНЫХ ИЗДЕЛИЙ ИЗ СВИНИНЫ ПРИ ИСПОЛЬЗОВАНИИ ЭЛЕКТРОАКТИВИРОВАННОЙ ВОДЫ

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Аннотация. В статье показано влияние электроактивированной воды на выход и органолептические свойства целлюлозных изделий из свинины. Установлена зависимость потерь влаги при термической обработке от вида бинарной смеси фракций электроактивированной воды в рассоле. Показаны изменения органолептических показателей (вкус, аромат, цвет, внешний вид и вид на разрезе) опытных образцов целлюлозных изделий. Отмечено практическое значение использования рассолов на основе электроактивированной воды для производства целлюлозных изделий деликатесной группы. Экспериментально доказано, что использование электроактивированной воды для приготовления рассола позволяет повысить выход готовых продуктов на 3,8 - 7,3% в сравнении с контрольными образцами. Приведены рекомендации относительно использования бинарных смесей фракций электроактивированной воды для приготовления рассолов.

Ключевые слова: мясо, деликатесы мясные, органолептические показатели, выход, католит, анолит, рассол.

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