

The use of unconventional methods of physical processing in production of protein meat snacks with increased nutritional and health value

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Objectives: Snacks are convenient foods usually intended for people who would like to satisfy short-term hunger. 'Traditional' snacks are associated with foods high in fat and carbohydrates. However, recent nutritional trends have shifted consumer preferences to protein-rich products. The aim of the research was to develop a protein meat snack with addition of plant ingredients with pro-health properties. The raw materials were: poultry and pork meat, as well as plant materials, including waste materials obtained after pressing hemp oil.

Materials and Methods: Before osmotic dehydration raw meat was cut along the muscle fibers to obtain pieces of similar weight and shape (20 cm × 4 cm × 2 cm). The method of immersing the raw material in an osmotic solution in a mass ratio of 1:2 was used for the osmotic dehydration. After the dehydration process, the raw meat were ground in a grinder (a mesh with a pore of 4 mm). The plant raw materials were chopped up by hand using a knife. The thermal treatment was carried out in a combi oven (Rational AG, Germany) at 180°C (65% relative humidity) to obtain 68°C in the center of the product. Before starting the actual tests, a series of trial tests were carried out in order to develop a recipe for meat bars and to select the optimal dehydrating solution composition. The product treatment, which was dehydrated for 48 hours in a solution consisting of 4% curing salt + 56% maltose syrup + 40% water, was recognized as a product with the most satisfactory sensory properties. Meat bars are made of meat, hydrated hemp pomace (pomace: water in a 1:2 ratio), a mixture of seeds and fruit (sunflower seeds, pumpkin seeds, black cumin, cranberry), spices (ground black pepper, granulated garlic), cranberry juice and sweet potato dye. The evaluation of the quality of meat bars included determination of the content of chemical components (near infrared transmission spectrometry), heat treatment yield, instrumental measurement of color (CIELAB), and texture (TPA test) parameters, water activity, and consumer assessment.

Results and Discussion: It was found that the use of meat dehydration in an osmotic solution (4% curing salt + 56% maltose syrup + 40% water) for 48 h, at +4°C, was a good method of dehydration of poultry meat, where the highest weight losses were obtained. However, the use of the same solution and the same parameters did not result in obtaining satisfactory dehydration effects for pork. The osmotic dehydration of poultry meat and the use of hemp flour for the production of meat snacks resulted in the concentration of nutrients, in particular proteins, in the ready-to-eat product. The highest protein content was determined in meat bars made from poultry meat, while the lowest - in pork products. The lowest water content was found in pork products, while poultry and mixed meat products were characterized by a higher water content in the snack with a higher degree of dehydration of the raw meat used. The difference in water content between poultry and mixed snacks was not significant. The fat content in snack products largely depended on the meat used for production. The lowest content of this nutrient was found in bars made of poultry meat, and the highest in pork bars. Osmotic treatment of meat raw materials did not significantly reduce the water activity in the ready-to-eat product, which may result in the need to apply additional technological treatments to increase the microbiological safety of meat snacks. The use of curing salt in an osmotic solution did not provide the characteristic pink-red color of meat bars, only the addition of a coloring food in the form of sweet potato dye allowed to obtain a product with the desired, attractive color. Based on the TPA test results, significant differences were found in the examined parameters of the texture of meat bars depending on the meat used. Higher values of texture parameters for poultry meat products could result from a greater degree of dehydration of this meat, and thus - a greater concentration of nutrients (including protein) and the lowest fat content in the ready-to-eat product. The developed recipe of meat bars allowed for the production of a new snack with satisfactory sensory characteristics. The perceptible sweet aftertaste, which was the result of the osmotic dehydration process with the use of maltose syrup, did not adversely affect the overall quality assessment of meat bars.

Conclusions: The conducted research indicates the possibility of producing a new meat snack with plant ingredients with acceptable sensory characteristics and high nutrition value. The osmotic treatment of the poultry meat allowed for an effective increase in the protein content in the ready-to-eat product. Nevertheless, there is a need for further research to better understand the effect of the dehydrating process using osmotic solutions on the quality of meat snacks.

Key words: Meat snacks, Osmotic dehydration, Poultry meat, Pork meat, Hemp flour