

INFLUENCE OF OILSEED GROATS ADDITION ON THE YIELD OF MINCED MEAT PRODUCTS

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Abstract. This study includes investigation of the influence of oilseed groats on the thermal treatment yield of the final product – “mici” from sheep and poultry meat (70:30). 7% groats of walnut, pumpkin and sesame seeds and 2% wheat fibers were used. There has been determined water content, fat, protein, water retaining capacity and fat retaining capacity, emulsifying capacity of oilseed groats, thermal treatment efficiencies on the final product. Sensorial characteristics of the groats were studied. As the result it was established that the addition of groats in the “mici” of sheep and poultry meat reduces the mass loss after heat treatment.

Keywords: *oilseed groats, thermal treatment effect, sheep meat, poultry meat, sensorial characteristics, physico-chemical characteristics, functional-technological characteristics*

Introduction

The scientific basis of the modern food production strategy is: the search for new resources of essential food components, the use of non-traditional basic raw materials, the development of new advanced technologies to increase the number of food products and the biological value of the product with desired properties [1].

The groats are the most important products of the vegetable oils industry. The nutrition value of the groats is represented by a high protein content (35-50%), mineral substances (6-7%), vegetable fats (5-40%), carbohydrate residues, and this makes its use in the manufacture of food products [2].

The objective was to establish physico-chemical properties of minced meat products with addition of walnuts groats, groats of pumpkin seeds, groats of sesame seeds and wheat fibers and determination of the impact of the oil seeds groats on the efficiency after thermal treatment.

Materials and methods

The researches were performed at the Food Biotechnology Laboratory of the Public Institution “Scientific-Practical Institute of Horticulture and Food Technologies” and at the Department of Food Products Technology, FFT, TUM.

The sheep meat was procured from “Technical Support Enterprise from Bardar” Jsc and the poultry meat from the “Floreni” Jsc, from which the minced meat was prepared with nut groats addition, obtained in the FPT department, pumpkin seeds groats and sesame seeds

groats, both purchased from “Rozavena” Doctor Oil” Ltd and with the addition of wheat fibers, kindly provided by “Ingreda” Ltd.

Sheep and poultry meat in a ratio of 70:30 was replaced with 7% of groats and 2% of wheat fibers. Four types of semi-prepared meat products from minced sheep and poultry meat with addition of wheat fibers were prepared based on the previously developed recipes. The obtained semi-prepared meat products from minced sheep and poultry meat have been stored at $t=0...+4^{\circ}\text{C}$, $W_{\text{air}}=75...78\%$, $\tau=5$ days.

The samples of groats were studied on water content [3], fat [4], protein [5] and water retention capacity, fat retention capacity, emulsifying capacity [6, 7], appearance, smell, color and taste [8] and thermal treatment yield of the final product: semi-prepared meat products of minced sheep and poultry meat with the addition of groats and wheat fibers [9].

Results and discussions

Table 1 presents the organoleptic, physico-chemical and functional-technological characteristics of walnut groats, pumpkin seed groats and sesame seed groats. The protein mass fraction (Table 1) in walnut groats is 17,7% lower than in the pumpkin seed groats and 27,86% than in sesame seed groats. The highest fat content is found in walnut groats, 25,29% more than in pumpkin seed groats and 20,52% than in sesame seed groats. The content of protein and fat in groats was influenced by the initial fat and protein content of the seeds and by the extraction method.

The functional-technological characteristics of the groats Table 1 make it possible to recommend it for usage in food industry as binding ability components due to water retention capacity, to fat retention capacity and to emulsifying capacity.

Table 1

Quality parameters of the vegetable additives						
Nº	Type of groat	Parameter	Walnut groats	Pumpkin seed groats	Sesame seed groats	
Organoleptic characteristics						
1.	Appearance		Fine particles without the presence of moldy particles or foreign substances			
2.	Smell		Characteristic for walnut, no foreign smell.	Characteristic for pumpkin seeds, no foreign smell.	Characteristic for sesame seeds without foreign smell.	
3.	Color		Light yellow to light tan.	Yellow-green to light brown.	White to light brown	
4.	Taste		Characteristic for the core of walnut, with no foreign taste.	Characteristic for the pumpkin seed, with no any foreign taste.	Characteristic for sesame seeds without foreign flavors.	
Physico-chemical and functional-technological characteristics						
1.	Water content, %		9,0	9,0	9,0	
2.	Protein, %		26,92	44,62	54,78	

Table 1 (continuation)

3.	Fat, %	35,20	9,91	14,68
4.	Water retention capacity, %	28,6	30,0	21,4
5.	Fat retention capacity, %	11,6	15,6	11,6
6.	Emulsifying capacity, %	55,3	61,1	64,3

The technology of the semi-prepared meat products made of sheep and poultry minced meat includes chopping of sheep and poultry meat into a grinder machine with diameter of the mesh holds of 2-3 mm, sheep and poultry meat addition in the agitator, walnut groats, pumpkin seed groats, sesame seed groats, salt, sodium bicarbonate, fresh garlic, grounded black pepper, grounded red pepper, pre-hydrated wheat fibers in ratio of wheat fibers: water 1:5 for 60 minutes with water temperature +20...+25 ° C and drinking water, mixing of the composition to a homogeneous mass, shaping of the semi-prepared meat products, packing and storage in chilled or frozen form.

Other technological problems associated with lowering fat content include reduction of particle-to-heat bonding, reduced succulence, crumbling, excessive juice removal and reduced shelf-life. The fat content of semi-prepared meat products can be reduced by replacing the fat with water, adding carbohydrates and / or proteins or using functional ingredients.

Replacing fat with water reduces fat content, but results in concomitant changes in texture and water retention capacity - so it is limited to low values.

The addition in low-fat and protein-reduced minced meat products of functional ingredients from various vegetable and animal sources as fillers, binders, emulsifiers or diluents can improve the ability to retain / bind water and modify the texture. It also increases the yield of the finished product and reduces cooking losses.

The heat treatment yield represents the mass loss due to heat treatment Eq. (1) [9].

$$R = m_1/m_0 \times 100 \% \quad (1)$$

where: R – thermal treatment yield, %;

m_1 – mass of the heat treated sample, g;

m_0 – sample mass in the raw state, g.

Having similar properties to soybean flour (which is widely used in the industrial manufacture of minced meat products), being rich in protein and starch, oleaginous groats have been proposed and tested in this work for use in low fat meat preparations.

The results shown in figure 1 show that the incorporation of the groats in the minced meat of sheep and poultry reduces weight loss on heat treatment and thus leads to increased yield of the finite product of the small ones. The addition of 7% of groats and 2% of wheat fibers reduces mass losses compared to the control sample, which is 6,1% for nut groats, 20,3% for samples with the addition of pumpkin seedgroats and 6,9% for samples with the addition of sesame seed groats. Samples of sheep and poultry minced meat (control sample) after heat treatment showed a mass loss of about 36,0%.

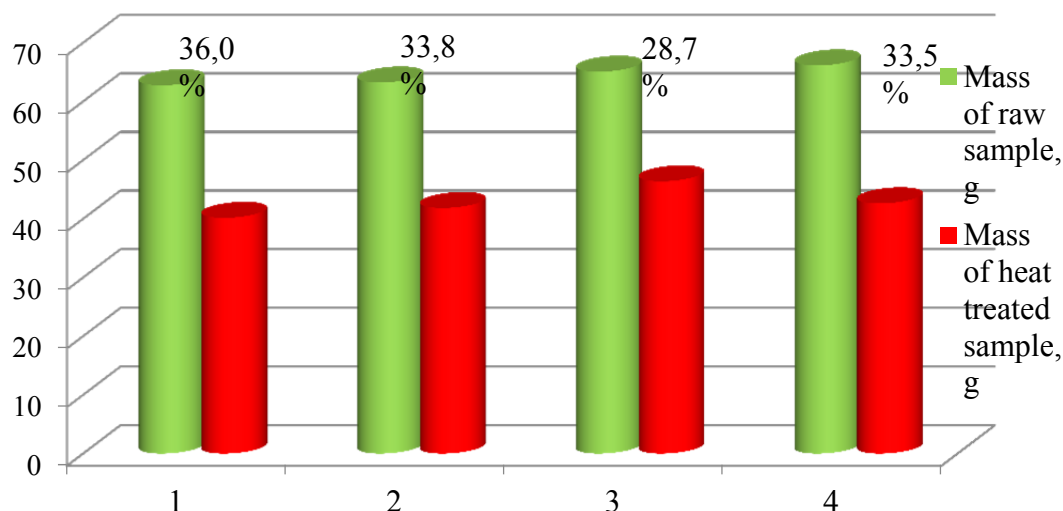


Figure 1. The yield of minced meat semi-prepared meat products after thermal treatment.

1 – „mici” from sheep and poultry meat (70:30) – control sample; 2 – „mici” from sheep and poultry meat (70:30) with 7% walnut groats and 2% wheat fibers; 3 – „mici” from sheep and poultry meat (70:30) with 7% added pumpkin seed groats and 2% wheat fibers; 4 – „mici” from sheep and poultry meat (70:30) with 7% sesame seed groats and 2% wheat fibers

Conclusions

The additional use of 7 % oil seeds goats and 2 % wheat fibers in minced meat semi-products impacts positive on the sensorial properties of final product such as appearance, smell, taste by softness and succulence of the finished product.

The physico-chemical analysis results that seed groats and wheat fibers influence on water retention capacity at 30 % for seed groats and 62 % for wheat fibers. Capacity of walnuts groats, groats of pumpkin seeds, groats of sesame seeds and wheat fibers to hold water increase volume and weight of the meat products, thus improving quality characteristics. As a result, the heat treatment yield decreased to 20% comparative with the control sample.

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