

Use of whole sunflower kernels in cooked perishable

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SUMMARY: The possibility to use whole sunflower kernels in cooked perishable sausages has been studied. The added amounts of sunflower kernels were 3, 5 and 10% in relation to the meat quantity. The water-holding capacity and emulsion stability of the filling mass have been determined. The finished product has been evaluated for protein, fat and ash contents, and production yield. It has been established that additions of less than 10% improve the water-holding capacity and emulsion stability of the filling mass. The best results have been observed with 3% additions where the free water content is the lowest (0.70%) compared to the control samples (4.06%). Increases above 3% and up to 10% have resulted in respective decrease of the water and fat contents in both sausage varieties. At the same time, the protein content has increased by 3%. The yield for the test samples with 10% additions is at average 12% higher than the yield for the controls.

INTRODUCTION: Recently there has been an ever increasing interest for the sunflower as a potential source of vegetable proteins that can be used in various branches of food industry. From biological and nutritional point of view, sunflower proteins are of very high grade because of the considerably high content of some essential amino acids (Lin et al., 1974). It has been found out that their proteins are superior to the majority of vegetable proteins. The major disadvantage of the sunflower protein products is their low lysine content and relatively high simple sugars and phenolic acids which tend to form complexes very fast and receive dark brown color. The lack of lysine, however, is not considered of critical importance because this amino acid is produced commercially and can be added to the protein preparation (Chimirov et al., 1981). The processing of the sunflower seeds generally involves oil extraction and until recently manufacturers have been looking for possible ways for subsequent utilization of the remaining sunflower cake for nutritive purposes. This, however, necessitates additional processing. The recent tendency is to insert whole sunflower kernels in various foodstuffs. The results of their additional enrichment with unsaturated fatty acids that are specific for the sunflower and that are indispensable components of many dietary foods.

In relation to the above considerations, the present work has set the objective to investigate the possibility to use whole sunflower kernels in cooked perishable sausages both as protein enricher and partial substitute to the animal fats as well as improver of the fatty acid composition of the finished meat products.

MATERIALS AND METHODS: Whole sunflower kernels have been beforehand dehusked and then used for the tests.

The sunflower kernels were added in amounts of 3, 5 and 10% in relation to the meat quantity in two varieties of cooked perishable sausages; "Kamchiya" sausage (50 kg nonfat pork, 50 kg semi-fat pork, 2.500 kg salt, 0.010 kg nitrite, 0.100 kg sugar, 0.200 kg pepper, 0.050 kg nutmeg). The sausage varieties were manufactured according to the established technology for cooked per-

ishable sausages. Control samples without sunflower kernels were prepared in the same way. The effect of the whole sunflower kernels on the technological properties of the filling mass was determined by Gray's method (1964) for water-holding ability, and by Kozin's centrifuge method for meat emulsion stability test. Measurements of the meat pH and water content were also taken by sample drying to a stable weight (Sartorius et al., 1928). The water content of the finished product was determined by drying until stable weight. The total fats, proteins, ash, and production yield were also measured. The ash content was measured by heating the sample to stable weight. The product was organoleptically evaluated by a 9-member taste panel according to the 9-grade scale worked out by VNIIMP, Moscow. The results obtained were analysed by the methods of mathematical statistics (Georgieva et al., 1987).

RESULTS AND DISCUSSION: The results from the tests on the functional properties of the filling mass of the control and test samples are given in Tables 1 and 2 for both sausage varieties, respectively.

Table 1. Functional properties of the filling mass for "Kamchiya" sausage

Characteristic	Control	T e s t s a m p l e s		
		3 %	5 %	10 %
Waterholding capacity,% free water	4.06±0.15	0.70±0.03	1.75±0.78	3.92±0.18
Emulsion stability,liquid phase	1.0±0.04	0.21±0.01	0.63±0.29	0.80±0.04
pH	6.42±0.28	6.45±0.30	6.45±0.30	6.45±0.03
Water content % of total mass	61.42±3.00	61.80±3.04	53.40±2.63	49.60±2.36

Table 2. Functional properties of the filling mass for Prague frankfurters

Characteristic	Control	T e s t s a m p l e s		
		3 %	5 %	10 %
Waterholding capacity,% free water	3.15±0.10	0.50±0.006	0.78±0.008	1.92±0.02
Emulsion stability,free liquid phase	0.80±0.04	0.00	0.15±0.01	0.53±0.19
pH	6.45±0.23	6.50±0.26	6.50±0.25	6.50±0.26
Water content,% of total mass	66.23±3.15	64.25±3.21	63.78±3.12	61.35±2.96

The analysed results from Tables 1 and 2 show that both types of filling mass have similar functional properties. A general tendency was that the whole sunflower kernels had a favourable effect on the filling mass characteristics. The most significant are the changes that occurred in the water-holding capacity and meat emulsion stability.

It has been established that all three addition ratios improved both the water-holding ability and emulsion stability, and the best results were observed with 3 % additions. With increased amounts (up to 5 and 10 %) these two characteristics tend to decrease insignificantly and remain still more favourable than those for the controls. It has been established that the addition of whole sunflower kernels does not change significantly the pH levels of

the filling mass.

With increased additions the water content in both varieties decreased that is probably due to the lower water content of the sunflower kernels.

The results from the physico-chemical tests of "Kamchiya" sausage and Prague frankfurters with and without additives are given in Tables 3 and 4, respectively.

Table 3. Physico-chemical composition of "Kamchiya" sausage

Characteristics	Control	Test samples		
		3 %	5 %	10 %
Water content,% of total mass	57.58±2.34	57.26±2.33	48.72±2.15	47.57±2.13
Fat content,% of total mass	27.61±1.36	25.34±1.12	24.33±1.14	19.39±0.90
Proteins content,% of total mass	10.62±0.47	11.55±0.51	12.18±0.57	14.08±0.71
Ash, %	1.23±0.04	1.53±0.06	1.96±0.08	2.39±0.10
pH	6.50±0.30	6.60±0.29	6.60±0.31	6.60±0.30
Yield, %	104.11±4.92	108.33±5.00	111.62±5.12	116.20±5.44

The results in Tables 3 and 4 show that the increased 10 % additions of sunflower kernels entail respective decrease in the water and fat contents of the finished product. At the same time, the protein content rises by an average of 3 %. The same tendency was observed for the ash content which increased from 1.23 and 1.31 % in the control samples to 2.39 and 2.11 % respectively.

Table 4. Physico-chemical composition of Prague frankfurters

Characteristics	Control	Test samples		
		3 %	5 %	10 %
Water content,% of total mass	63.04±3.11	61.07±3.06	61.02±3.01	59.11±2.97
Fat content,% total mass	26.51±1.25	25.34±1.24	23.58±1.12	21.45±1.03
Proteins content,% of total mass	11.73±0.59	12.96±0.60	13.88±0.64	15.12±0.76
Ash, %	1.31±0.04	1.56±0.07	1.87±0.09	2.11±0.10
pH	6.55±0.28	6.55±0.30	6.60±0.30	6.60±0.31
Yield, %	114.21±5.50	116.20±5.71	119.17±5.90	125.84±6.30

The used additive had insignificant effect on the pH levels of the sausages. The higher amounts of sunflower kernels gave higher yields; for test samples with 10 % addition the product yield rose by an average of 12 %. The lowest levels of water and fats, the highest level of proteins, and the highest product yield was observed in test samples with 10 % additions.

The organoleptic evaluation was most favourable for sausages with 3 % addition when compared to the control samples. The sausages with 5 % addition received higher grades for flavor, taste, texture, juiciness, and had a total of 8.70±0.40 % as compared to the control

($8.23 \pm 0.57\%$). The samples with 5 % additions were close to the controls, and those with 10% additions were lower than the controls but still the sausage properties were good and desirable.

CONCLUSIONS: 1. The addition of whole sunflower kernels in amounts up to 10 % in cooked perishable sausages improves the properties that characterize the filling mass, and the best results are obtained with 3 % addition.

2. The increased additions of whole sunflower kernels up to 10 % result in higher protein content and higher finished product yield while on the other hand the fat content decreases.

3. The use of 3 % sunflower kernels improves the organoleptic properties of the experimental cooked perishable sausages when compared with the control samples.

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