STUDY OF COMPOSITION OF VOLATILE COMPONENTS OF FAR EASTERN BALSAMS AND THEIR EFFECT ON TASTE AND AROMATIC PROPERTIES OF UNCOOKED SMOKED MEAT PRODUCTS

Zharinov A.I.
Moscow State University of Applied Biotechnology
Tekutieva L.A., Kostenko Yu. G.
All-Russian Meat Research Institute named after V.M. Gorbatov
Misharina T.A.
Institute of Biochemical Physics (RAN)

Introduction

The question of multi-purpose usage of specific kinds of biogenic plant raw materials, in particular, spicy, taste and aromatic herbs and plants from the Far Eastern region, during manufacture of mass- and curative-and-preventive purpose foods arouses great scientific and practical interest.

Variety of the known plant forms, specificity of their composition and properties, available positive experience of their usage allow to think that many of them have a wide spectrum of potential technological, functional, and medical-biological possibilities. A group of researchers [1, 6, 7] as well as the authors [2, 3] systematized a group of culinary and medicinal herbs by chemical and technological properties, on the basis of what the most perspective kinds were chosen. By way of experimental researches it was established that a number of herbs had antioxidant [5] and bactericidal [6] action, ability to intensify color-forming processes [7], aggregation of muscular proteins [2], improved taste and aromatic properties of cooked products [4].

In development of the above direction, a series of investigations on studying the composition of volatile components in two samples of the Far Eastern water-alcohol balsams and in meat fermented products cooked with their usage was carried out.

Objectives

The objective of this investigation was to study and identify the composition of taste and aromatic substances contained in two kinds of water-alcohol balsams prepared on the basis of wild Far Eastern herbs and plants, as well as uncooked smoked all-muscle beef and pork products manufactured with utilization of a complex of balsams and bacterial preparation by the gas chromatography analysis method.

Materials and Methods

Water-alcohol (35-45 % of ethanol) balsams, as well as samples of uncooked smoked all-muscle beef and pork products in whose formulas cognac (control) and composition of starter cultures and balsams "Velvet antlers on honey" (test 1) and "Russian island" (test 2) were used as material of investigations.

Gas chromatography analysis of volatile substance concentrate components was carried out on "Micromat-412" chromatograph, on tused silica capillary column SE-30. Relative content of volatile substances was calculated by the ratio of area of substances to the area of the internal standard peak which was taken equivalent to 4 mg/kg (l).

Results and Discussion

Identification of substances was carried out by comparison of values of investigated sample component retaining indices on two columns of different polarity with the standard ones [8].

It was established that original (initial) balsams had a number of common volatile compounds, but their concentrations were not sufficient to considerably affect the aroma of the cooked product. Among the volatile components by their content predominate ethyl acetate, 2-methyl propanol, 3-methyl butanol, limonene, and borneol.

Analysis of the qualitative and quantitative composition of volatile components of uncooked smoked products showed that the product aroma was formed by volatile spirits, carbonyl and sulfur-containing compounds, whose predecessors were amino acids and lipids of meat raw material, as well as by phenol derivatives – smoke fume components. Some compounds may be metabolites of enzyme preparations or microflora. As concentration of volatile components in the added balsams is not high, their role in forming the odor of cooked products consists, probably, in the fact, that extracts and enzymes contained in them affect oxidizing and proteolytic processes in meat. Flavanoids and phenolic compounds discovered in vegetable raw material are strong antioxidants. The degree of oxidizing processes was evaluated by the concentration of saturated and unsaturated aldehydes, 2.4-decadienal being indicator compound formed directly from unsaturated fat acids (see Table below).

Content, mg/kg	Uncooked smoked beef			Uncooked smoked pork		
	control	test		control	test	
		No. 1	No. 2		No. 1	No. 2
Saturated and unsaturated aldehydes, including 2.4-decadienal	17.69	16.90	17.47	18.11	17.25	13.50
	0.56	0.38	0.36	1.07	0.42	0.52
Phenol derivatives	55.79	57.21	60.20	59.71	42.71	41.64

Comparison of the findings points to the fact that oxidizing processes are less expressed in the test samples (particularly in those from pork meat). Phenol derivatives make the main contribution to formation of the aroma of investigated products as their content considerably exceeds the concentration of carbonyl compounds.

Organoleptic evaluation of various kinds of meat products demonstrated certain advantages of products manufactured with the usage of a complex of water-alcohol infusions and bacterial cultures, regarding such properties as aroma, taste, and color. All samples were safe by their sanitary indices.

Conclusion

The experimental findings allow to express some suppositions regarding effect of water-alcohol Far Eastern balsams on processes of formation of taste and aroma substances when manufacturing uncooked smoked meat products. In particular, one may suppose that introduction of balsams leads to inhibition of lipide oxidation processes and certain changes in the development of autolytic and enzyme-microbiological processes, what tells on the quantitative ratio of terpenes and phenols, decrease of the content of carbonil compounds. As a result, the products fabricated with the usage of balsams had more pleasant and original taste and aroma in contrast to control samples.

References

1. Khoralsky V.V., Sokolova N.A. Usage of water-alcohol herb infusions during manufacture of uncooked smoked sausages. Series "Meat and refrigeration industry"// M.: AGRONIITENPP. 1996. Issue 4. P. 1-5.
2. Zharinov A.I., Tekutieva L.A., Kostenko Yu. G., Sokolova N.A., Markina M.V. Effect of the complex of water-alcohol balsam and bacterial preparation on the degree of digestibility of meat product protein. Materials of the 3rd International Scientific-Technical Conference "Food. Ecology. Man" – Ministry of education of the Russian Federation, Ministry of Science, RASHN, MGUPB//M.: 1999. P. 41.
3. Kostenko Yu. G., Tekutieva L.A., Zharinov A.I., Sokolova N.A. New kinds of uncooked smoked products// Meat Industry. 2000. No. 2.
4. Rogov I.A., Boreskov V.G., Sokolova N.A., Misharina T.A. Evaluation of effect of water-alcohol herb infusions on taste and aroma properties of uncooked smoked sausages// Meat Industry. 1996. No. 6. P. 13-14.
5. Boreskov V.G., Mizeretsky N.N., Sokolova N.A. Effect of alcohol herb infusions on qualitative characteristics of grease// Meat Industry. 1997. No. 1. P. 27.
6. Rogov I.A., Boreskov V.G., Stepanenko P.P., Sokolova N.A. Evaluation of sanitary condition of uncooked cured products. Materials of the International Scientific-Technical Conference "Food. Ecology. Man" – Ministry of Science, RASHN, MGAPB//M.: 1995. P. 209.
7. Rogov I.A., Boreskov V.G., Sokolova N.A. Effect of technological additives on integral color characteristics of uncooked smoked beef. Materials of the 2nd International Scientific-Technical Conference "Food. Ecology. Man"//M.: 1997. P. 56-57.
8. Davies N.W. Gas chromatographic retention indices of monoterpenes and sesquiterpenes on methyl silicone and carbowax 20M phases//J. Chromatogr. 1990. V. 503. P. 1-24.