

The Study of Meat Products Flavourings Developed on the Basis of Spicy Essential Oils and Meat Flavour based on Maillard Reaction

A.A.BELOUSOV, V.A.ANDREJENKOV, G.L.SOLNTSEVA, N.V.ROMANOVA, and I.I.AFANASYEVA

The All-Union Meat Research and Designing Institute, Moscow, USSR

V.I.KALUGINA

The Ukrainian Research Institute of Meat and Dairy Industries, Kiev, USSR

SUMMARY: Using physico-chemical, spectral and organoleptical methods research was done aimed at development of complex flavourings (CF) ensuring intensification of meat and spicy aroma. The use of CF for sausages made possible to exclude from formulations mixes of dry traditional spices and ensure well-expressed aroma and taste of products. It was established that CF contribute to development and stabilization of cooked sausages colour.

INTRODUCTION: Development of new meat products of increased nutritive value with the use of protein components of animal and vegetable origin demand enriching of technology by effective flavourings, ensuring specific pleasant taste and aroma of sausages and hams, fine spicy aroma, smoked flavour, etc. Earlier we developed spicy flavourings (SF) on the basis of essential oils composition obtained from native carriers which are by their taste and aroma adequate to mixtures of dry foreign spices traditionally used for cooked sausages manufacture. Besides, food additives were developed, possessing meat flavour (MF) obtained through products of Maillard reaction (Solntseva G.L. et al., 1989; Timozhuk I.I. et al., 1989).

The aim of the present study was to develop complex flavourings (CF) reinforcing meat aroma, and at the same time creating taste and flavour of real spices. Development of CF with different organoleptical tints, makes possible to widen their practical use in a number of product group.

MATERIALS AND METHODS: Experimental material was SF developed on the basis of essential oils, dispersed on dry carrier, the latter consisting of ingredients traditionally used in cooked sausages formulations. SF in a powder form was used instead of mixture of traditional spices - black pepper and allspice. Besides, enhancer of meat flavour (MF) was studied, that one being in a dry form and obtained as result of Maillard reaction of hydrolysates of meat industry by-products (bones, spleen, etc.) with monosaccharides and addition of sulphur-containing compounds.

Possibility of SF and MF combination was studied in order to reach complex flavour effect at sausage manufacture.

Samples of cooked sausages were prepared according to the following scheme:

N1 - control - made according to existing technology with the use of traditional dry mix of black pepper and allspice; N2 - the same that N1, with addition of MF (0.3% by weight of raw material); N3 - instead of traditional mix of spices SF was added (0.15% by weight

of raw material); N4 - with the use of SF (instead of mix of spices) and MF at the same level as for samples 2 and 3; N5 - the same as N4 but SF and MF dosages were reduced by two times.

Assessment of quality characteristics was done by sensory methods with the help of trained panelists (n=9) using 9-point hedonic scale, according to the following parameters: appearance, colour of the cut surface, taste, aroma, consistency and total acceptance score.

Colour characteristics were measured using "Spectrotone" colorimeter of the "CieLab" system in spectral range 380-720nm; "L", "a" and "b" colour coordinates were also determined.

RESULTS AND DISCUSSION: Results of the study are given in the Table.

As it is seen from the Table, MF addition to formulation of sample 2 improved its taste as compared to sample 1, without significant influence on colour, aroma and consistency. Sample 3, where dry mix of spices was substituted by SF, received high score for all quality parameters.

SF improved colour, taste, aroma and total acceptance of the product. The use of SF and MF in combination in samples 4 and 5 showed reinforced effect of the two flavourings; however, sample 5 was assessed higher by organoleptic characteristics and total acceptance. We should note good correlation of organoleptic assessment with instrumental measurement of "L", "a" and "b" spectral characteristics.

Table: Quality characteristics of "Stolovaya" sausage with complex composition of spicy flavour (SF) and enhancer of meat flavour (MF)

N° of sample	Type of samples	Amount of flavouring per 100kg of uncured raw material, g	Organoleptical assessment, score					Colour coordinates in CieLab system	
			colour	aroma	taste	consistency	total	L	a
1.	Control	300	6.2	6.6	6.1	6.9	6.6	66.25	11.96
2.	Test with MF	300	6.5	6.8	7.0	6.9	6.6	66.0	12.09
3.	Test with SF	150	8.1	7.7	7.7	7.1	7.5	65.13	13.46
4.	Test with SF and MF and MF	150	7.2	7.5	7.3	7.0	7.3	65.61	12.33
		300							
5.	Test with SF and MF	100	8.0	8.2	8.2	7.1	8.0	66.25	13.09
		200							

Comparing results of aroma, taste and colour assessment, we could draw conclusion that combination of MF and SF at optimal level of addition (used for sample 5) is the most perspective for use. In this case flavouring dosages were reduced two times as compared to their level of addition when they were used separately.

The obtained results evidence about synergistic effect of SF and MF, and that was

ken into account in process of development of complex flavourings, ensuring specific taste and aroma of sausage items and improving colour formation.

The best effect of CF is achieved when they are used for manufacture of meat products, containing proteins of animal or vegetable origin when compensation of taste and aroma is needed.

The study of CFs also showed that they ensure products with bright stable colour. This is connected with availability of essential oils in CF composition which contain natural antioxidants, inhibiting oxidation of lipids and consequent oxidation of heme pigments of meat system.

Inhibitory mechanism of heme pigments due to antioxidants of essential oils could be revealed through spectrum of colour reflection on the cut surface of sausage items, using registering spectrophotometer SPh-10.

Fig.1 shows spectrum of reflection (fragment in the range of 550-750nm). Spectrum of test samples prepared with CF and containing essential oils (samples 3,4 and 5) had a typical look of a curve, differing from spectrum of samples prepared without essential oils (samples 1 and 2), this correlating with organoleptical assessment of sausage colour. Samples 3,4 and 5 showed the best colour, well-expressed "pure" taste and flavour.

Thus, with the help of spectral analysis, the working hypothesis was proved about the mechanism of effect of spicy flavourings, containing essential oils, on formation and stabilization of sausage colour.

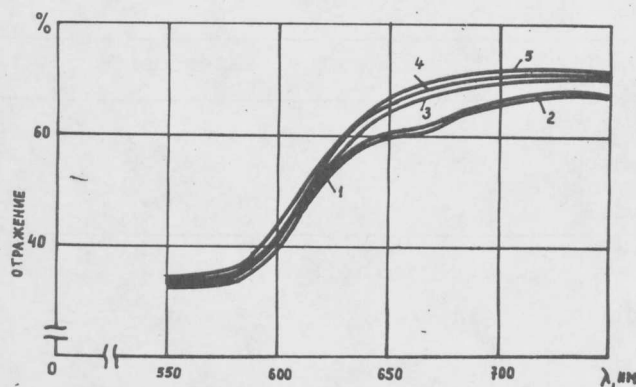


Fig.1 Colour reflectance spectrum of sausage samples surface.

1 - control; 2 - MF added; 3 - SF added; 4 - MF + SF added(300/50); 5 - MF + SF added (150/75).

CONCLUSION: On the basis of physico-chemical, spectral and organoleptical studies, complex flavourings were developed, ensuring well-expressed specific taste and aroma, and bright stable colour of sausages.

It was established that the use of CF can completely substitute mixes of dry tropical spices, traditionally used in sausage formulations. It was shown that SF should be better used in sausages manufactured with animal and vegetable proteins where reinforcement of meat flavour is needed.

Optimal dosages of CF were determined with the account of synergistic effect of MF and SF.

REFERENCES:

SOLNTSEVA G.L., ROMANOVA N.V., PRUIDZE V.G.; TCHELISHVILI R.G., NATSVLISHVILI L.G. (1989). Study of Quality Parameters of Sausages Manufactured with the Use of Flavourings Based on Essential Oils of Spices. Thesis of the All-Union Conference "Chemistry of Food Additives", Chernovtsy, 25-27 of April, 1989. Kiev, 1989, p.100.

TIMOZSHUK I.I., KOSTYUK E.A., RUDIN L.M. et al. (1989). The Use of Food Additives "Aroma-1" and "Aroma-2" During Manufacture of Combined Meat Products. Thesis of the All-Union Conference "Chemistry of Food Additives", Chernovtsy, 25-27 of April, 1989. Kiev, 1989, p.99.

ZCHURAVSKAYA N.K., ARTAMONOVA M.P., ZCHAVORONKOVA M.V. (1989). Perspectives of Meat Flavourings Use For Meat Products Manufacture. Review. AgroNIITEIMMP, M., 1989, 79p.