

Study of the possibility of the usage of natural colorants for obtaining traditional meat products

BOKUCHAVA M.A., ROZANTZEV E.G., KONDRATYUCK M.O., SIMBIREVA E.I.

+Institute of Biochemistry named after A.N. Bach, Academy of Sciences of the USSR, Moscow, USSR

The Moscow Technological Institute for the Meat & Dairy Industry, Moscow, USSR

The main requirement for food colorants is their safety and imparting of best attractive appearance to foods. Lately all the more important has become the use of natural colorants due to the discovery of cancer effects of nitrites used for coloring of meat products (1). Besides, extracts from fruit and plants apart from coloring pigments contain a great amount of vitamins and other biologically active substances. Addition of such extracts in the production of meat products will help to increase their nutritio al value. One of the cheapest and most available sources of raw material for getting natural colorants is red beet. Vitamines C, PP, B and B were found in red beet in addition to coloring substances. However red pigments of beet are unstable to prolonged effects of high temperature which limits their application in the production of meat products which undergo thermal processing (2). In this connection the aim of our test has become the research of thermal stability of the main beet pigment-betanine in the presence of such stabilizers as brown tea extract, the mixture of tea extract with ascorbic acid and ascorutine. The tea extract which is produced industrially out of non-standart raw materials is a cheap and valuable enricher of foods as it contains in addition to pigments such substances as caffeine, catechines, various vitamins, amino acids and organic acids (3). Physiologically active substances such as ascorbic acid and ascorutine are widely used in medicine for the avitaminosis treatment which makes it possible to use them in food production. Apart from this stabilizing effects of ascorbic acid is found in some tests in respect to thermal stability of beet pigments (4). Waste material of the beet production-dry powder of pressed pulp was used for the research. The powder was dissolved in distilled water in proportion of 1:60 and the received solutions were centrifuged. Tea extract, tea extract with ascorbic acid and ascorutine in quantity from 5 to 1000 mg/g powder were added as stabilizers to the received samples of beet extract. The stabilized beet extracts were warmed in thermostable test-tubes with air refrigerator for one hour at 100 C. The warming process having been over, the test-tubes were cooled with cold running water. Then the presence of betanine in thermo-treated samples was determined by spectrophotometric method at $\lambda_{\max}=537\text{nm}$ (5). In the experiment extracts without stabilizers and without undergoing thermal treatment were used as control samples. The gained results of the research showed (table 1), that without adding the stabilizer betanine in beet extracts was almost completely destroyed. The addition of tea extract in quantity from 5 to 10 mg/g did not show any substantial influence on betanine stability. But the perceptible stable effect of tea extract is observed under the same conditions of warming with the concentration of the stabilizer equal to 100 mg/g. The losses of betanine in this case constituted only 5%. The increase of the concentration of tea stabilizer to 400 mg/g leads to complete stabilization of the pigment. Any further increase of the stabilizer concentration does not lead to enhance this stabilizing effect.

Table I

The effects of tea extract on thermostability of betanine while warming at 100 C for one hour

n/n	The amount of tea extract, mg/g	The amount of betanine mg%	Losses of betanine %
1	0	2,5	80
2	5	9,0	25
3	50	11,0	10
4	100	11,5	5
5	250	11,5	5
6	400	12,0	0
7	750	12,0	0
8	1000	12,0	0
9	0	12,0	0
Control samples without warming			

The stabilizing effect of the coloring substances under the influence of tea extract apparently may be explained as the inhibitory effect of tea polyphenols on ferments of beet extracts, which cause destruction of betanine, and as interaction of polyphenols and betanines which lead to the formation of stable dissoluble complex combinations. Analyzing the data received under the joint action of two stabilizers tea extract and ascorbic acid (table 2) it was revealed that adding of ascorbic acid to the tea stabilizer does not give strong stabilizing effect in proportion (10+10) to (40+40) mg/g. But beginning with the proportion of stabilizers (50+50) mg/g a noticeable increase of betanine stabilizer is observed. The losses of pigment in this case was only 7%. The further increase of the stabilizer concentration does not lead to the increase of betanine. It is in place to mention here that despite almost identical stabilizing character of tea extract and its mixture with ascorbic acid the usage of mixture is preferable due to the increased

Table 2

The effects of tea extract with ascorbic acid on thermostability of betanine while warming it at 100°C for one hour

	The tea extract concentration, mg/g	Ascorbic acid concentration mg/g,mg%	Betanine concentration mg%	Betanine losses %
1	0	0	5,2	60
2	10	10	5,2	60
3	20	20	5,9	65
4	30	30	7,2	45
5	40	40	7,8	40
6	50	50	12,0	7
7	100	100	12,0	7
8	300	300	12,0	7
9	0	0	13,0	0

Control samples without warming

presence of vitamins in it. The fact of complete coloring stabilization of beet extracts under thermal treatment was confirmed in the tests where ascorutine was added as the stabilizer in the amount of 100 mg/g. Thus, one can draw a conclusion that high stability of coloring beet pigments under thermal treatment is observed when you add tea extract in the amount of 400mg/g, mixture of tea extract and ascorbic acid in proportion of (50+50)mg/g and ascorutine in the amount of 100mg/g. The application of natural colorants and stabilizers in meat production is rational because alongside with coloring effects they possess valuable biological properties which will allow to get vitaminized meat products.

References

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The heat treatment used in the processing markedly reduces the vitamin contents of the finished products. At the same time the nitrites used for coloring of the salted meat and sausage meat products are precursors of carcinogenic substances. Tests have been carried out to find out the effects of the tea extract and ascorutine in combination with the beet colorant on the functional properties of meat products with the aim of developing a nitrite free method of the color formation and vitaminization of meat products. The stabilizing effect of natural tea pigments and ascorbic acid was studied with the view of eliminating the betanine unstability to high temperature and alkaline reaction of surroundings. It has been established that the 400 mg% (concentration) of the tea extract and the 100 mg% (concentration) of ascorutine produce a strong stabilizing effect on the beet pigment thermostability. Besides, the tea compounds considerably increase the biological value and quality of meat products due to the presence of vitamin composites and other physiologically active substances in the tea extracts.