A study on the possibilities to insert a preparation from desugarized beet slices in cooked perishable sausages. I. Effect on the hydrophilic properties of the Fillins mass, product chemical composition and yield

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SUMMARY: The additive was inserted in pork sausages in amounts of 1.3 and 5% in relation to the meat raw materials under three different states (dry, prehydrated and emulsified). The effect of the additive on the warter-holding capacity and meat emulsion stability has been studied. The sausages have been measured for yield and protein, fat, and water contents. The results obtained indicate that the above additive has increased the water-holding capacity and meat emulsion stability irrespective of the type of additive state. However, 5% of dry additive upset the dispersion of the filling mass. It has been established that the additive elevates the protein content of the dry matter. With 1 and 3% dry additions, the protein in the samples rose to 19.53% and 20.31%, respectively, while in the controls it was 18.80%. With 1.3 and 5% prehydrated additions, protein contents rose to 19.40%, 20.02% and 20.74% respectively.

INTRODUCTION: One of the ways to compenste the lack of ballast substances in man's food in today's living conditions is to obtain and afterwards insert them in various food products ROGOV et al. (1987). The sources of such preparations can be the by-products from the wheat, fruit and vegetable processing technologies. Nutritive fibers are used to enrich bakery, confectionary, dairy, etc. products. The development of technologies for meat products enriched with ballast substances is of great prachtical significance. The available data show that the connective tissue proteins which are otherwise poorly assimilated have positive influence on the digestive processes ROGOV et.al (1988). Thus, the meat products compensated with high level properly treated connective tissue and enriched with nutritive fibers can satisfy the needs of the human body for ballast substances. With regard to this, the present work has investigated the possibility to insert a preparation from desugarized beet slices with high level of nutritive fibers in cooked perishable sausages. The effect of the preparation on the water-holding capacity and meat emulsion stability have been studied as well as the chemical composition and yield of the finished product.

MATERIALS AND METHODS: The experiments were carried out using a preparation from desugarized beet slices with particle size up to 150 m. Its composition per 100 g dry preparation was the following: 29 g hemicellulose, 10 g pectin, 9 g cellulose, 4 g lignine, 10 g vegetable proteins, 3-4 g sugar, 10 g water.

The preparation was prepared and inserted in three different states: variant I - dry; variant II - prehydrated in water; variant III - stable emulsion. The test sausage was "Kamchiya" with the folloing recipe:

For 100 kg filling mass, kg			
Nonfat pork	- 50	Nitrite (potassium or sodium)	- 0.006
Semifat pork	- 50	Sugar	- 0.100
Salt	- 2.200	Pepper	- 0.300
		Garlic - 0.100	

The filling mass was stuffed into made-up casings with 0.055 - 0.060 m diameter. The sausages were processed according to the established technology. Control samples without addition of preparation were also prepared. In the test samples with added emulsified preparation the additional amount of fat in the filling mass was at the expense of the semifat meat in the sausage recipe. The amounts of the enzyme used in the test sausages were 1%, 3% and 5% in relation to the meat quantity. These amounts were consistent with the ones used by other authors.

In order to establish the effect of the enzyme on the technological properties of the filling mass, measurements of the water-holding capacity and meat emulsion stability were taken. The latter was measured by Kozin's zentrifugation method, and the former by Gray's method as modified by Volovinskaya GRAU,G .(1964), KOZIN,N.(1966). The ready sausages were measured for water content by drying at 105°C until stable weight. The total proteins were defined by Kjeldahl's method, and the fats were measured by extraction with organic solvents in Soxlet's apparatus POZHARSKAYA et al.(1964), KJELDAHL (1983). Finally, the finished product yield was determined.

The results were analysed by the methods of mathematical statistics GERASIMOVICH et al. (1978), DVDENKO et al. (1977).

RESULTS AND DISCUSSION: The results for the effect of the enzyme preparation on the water-holding capacity of the filling mass of "Kamchiya" sausage are given on Fig.1.

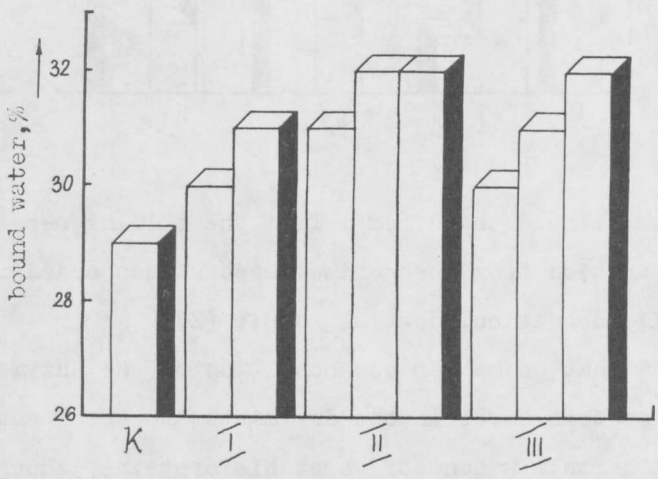

Fig.1. Amount of bound water (%) in the filling mass for "Kamchiya" sausage treated with enzyme preparation form desugarized beet slices added in dry (I), hydrated (II) and emulsified (III) condition; control sample (K).

The analysis of the results obtained by some authors indicate that the preparations from

nutritive fibers should not be inserted only in meat products because of their unfavourable influence on the technological properties of the filling mass KORNARI (1988). It is worth noticing that contrary to the above fact there was no precipitation observed when inserting dry enzyme preparation from desugarized beet slices at amounts of 1 and 5%. The increase to 5%, however, caused the quality of the filling mass to deteriorate (precipitate).

The results on Fig.1. show that our enzyme preparation, when added to the cooked perishable sausage "Kamchiya", has elevated the water-holding capacity irrespective of ist condition. Furthermore, the increase of the added enzyme also increases the amount of bound water in the filling mass. It has been noticed that the above relations are expressed best when the enzyme was emulsified.

The results obtained about the effect of the enzyme on the meat emulsion stability are given on Fig.2.

It is obvious that 1 and 5% additions result in decrease of the liberated liquid phase compared to the control sausages which means that the enzyme has increased the stability of the meat emulsion in the test samples. With 5% additions, however, the ability of the meat emulsion to hold the liquid phase decreases and as a result the emulsion stabiliy also decreases. The amount that gives the best stabilization to the meat is 3%.

The results from the stubies of the chemical composition and yield of the finished product are given in Table 1.

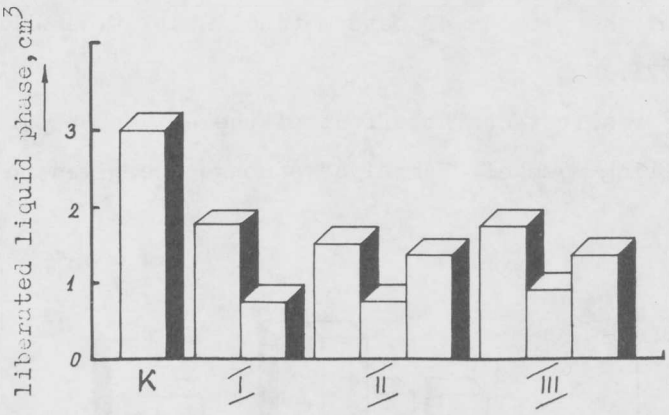

Fig.2. Amount of liberated liquid phase (cm^3) from the filling mass for "Kamchiya" sausage treated with enzyme preparation from desugarized beet slices added in dry (I), hydrated (II), and emulsified (III) condition; control sample (K).

It can be seen on Table 1 that no matter the condition of the enzyme preparation the latter contributes to a higher protein level in the dry matter to an extent that can be explained with the availability of certain amount of vegetable proteins, though not big, in the enzyme preparation.

It has been established that the enzyme has no effect on the fat content of the finished product. The finished product yield is higher than that for the control sausages due to the

Table 1. Chemical composition and yield for "Kamchiya" sausage prepared with enzyme preparation from desugarized beet slices.

Sample	Dry matter (%)	Oil content (% of d.m.)	Proteins (% of d.m.)	Yield (%)
Control	40.38 ± 2.31	69.80 ± 3.10	18.80 ± 0.84	104.50 ± 4.97
Varinat I 1%	39.52 ± 1.73	70.11 ± 3.15	19.53 ± 0.90	105.00 ± 5.00
3%	38.41 ± 1.69	70.03 ± 3.12	20.31 ± 0.92	104.51 ± 4.98
Variant II 1%	39.05 ± 1.70	70.15 ± 3.15	19.40 ± 0.88	105.05 ± 5.04
3%	37.84 ± 1.61	70.14 ± 3.14	20.02 ± 0.89	105.70 ± 5.10
5%	36.53 ± 1.59	70.15 ± 3.12	20.74 ± 0.95	106.03 ± 5.13
Variant III 1%	39.87 ± 1.72	71.08 ± 3.30	19.93 ± 0.93	105.50 ± 5.09
3%	39.06 ± 1.69	71.64 ± 3.34	20.12 ± 0.90	105.00 ± 4.97
5%	38.40 ± 1.68	71.37 ± 3.34	20.41 ± 0.91	105.52 ± 5.08

good functional prpperties of the preparation and its good emulsifying and water-holding abilities in particular.

As seen from the results, the higher yields have been reached when the enzyme preparation was prehydrated or emulsified.

CONCLUSIONS: 1. The enzyme preparation inserted in meat in amounts of 1, 3 or 5% for the production of "Kamchiya" sausage increases the water-holding capacity and meat emulsion stability irrespective of the condition of the inserted material. The 5% insertion of dry enzyme upsets the dispersion of the filling mass and no emulsion can be formed.

2. The inserted material elevates the protein level in the finished product.

3. The inserted material has no effect on the fat content of the finished product.

4. The enzyme used in "Kamchiya" sausage increases the finished product yield due to ist good emulsifying and water-holding capacity.

REFERENCES: - ROGOV,I.A.,TOKAEV,S., KOVALEV,Y.,(1987):Myasnaya industriya USSR, 4.
- DUDENKO,L.G.,KORDENCHEV,V.V. (1977): Matematicheskaya obrabotka i oformleniye rezultatov eksperimentov, Moscow.
- GRAU,G., (1964): Myaso i myasoproduktov, Pistepromizdat, Moscow.
- GERASIMOVICH,A.K., MATVEYEVA,J.K. (1978): Matematicheska statistika, Vishaya shkola, Moscow.
- KORNARI,M.S. (1988): Technologicheskiye svoistva myasnih sistem s pishtevimi voloknami. Recp.nauch.konf. 3-6 Oct. Odessa.
- KJELDAHL,J.C., (1983): en ny Methodwtil Kvaelstofkestemmelse i organiske stoffer, Medd. Carlsberg Lab., 2: 1-27.
- KOZIN,N.I.(1966): Primenenie emulsii v pistevoi promishlenosti, Pisht.prom., Moscow.