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GENERAL TECHNOLOGICAL FUNDAMENTALS OF QUALITY FORMATION AND PROTECTIVE PROPERTIES OF PAPER-BASED SHELLS

The first type of shell is called fibrous or fiber (fibrous), it is used in the production of cooked, boiled and smoked and smoked products, as well as for packaging products made without shells, to prevent them from shrinkage and mold, meat bread, ham, Canadian bacon, smoked ham, rolls, etc.).

Fibrous shells are made in a way similar to cellulose, but with a number of significant changes. Special long-fiber paper with high absorption capacity is unwound from a roller and formed into a tube of a given caliber. Then it is passed through an extruder, where viscose is absorbed by paper, then this "semi-finished product" passes through a coagulation, washing bath, after which the drying process takes place. It should be noted the difference in the production of cellulose and fibrous shells. In fibrous shells there is a long-fiber paper, which in this case acts as a reinforcement, which provides the shell with caliber stability and greater strength. Hence the common name of all fibrous shells produced in the world - viscose-reinforced.

The shells of the second type have limited application and are used mainly for cooked sausages of 2nd and 3rd grades [1]. We describe some fibrous shells characteristics and their production. After researching different types of paper (mica tape, long-fiber cotton, viscose and some brands of fine parchment) as the basis of

the shell was chosen uniform long-fiber cotton paper with a thickness of 0,04 mm. Various methods of impregnating paper with a viscous solution were investigated. As a result of the conducted experimental works the following technological scheme of obtaining a fibrous shell is proposed. Uniform long-fiber paper is glued with viscose in the form of a sleeve on a vinyl pipe, and then impregnated with viscose (without removing from the pipe) for 5 minutes. After that, the shell enters the molding bath containing a solution of ammonium sulfate at a concentration of 225 g / l and sodium sulfate – 100 g / l. Duration of processing of a cover in a bath - 10 min. The molding bath shell enters the regeneration bath with sulfuric acid concentration of 75 g / l, which is 15 minutes. After the regeneration process, the shell (removed from the pipe) outside and inside is thoroughly washed with water and then subjected to desulfurization in sodium hydroxide solution with a concentration of 5 g / l at a solution temperature of 85-90 °C for 10 minutes. Then the shell is washed again with water, treated with a solution of sulfuric acid at a concentration of 2,5 g / l, washed again with water, plasticized in a glycerin bath (at a concentration of glycerol 70 g / l for 10-15 min and then dried in a swollen state at a temperature of about 100 °C. The content of sulfur and residual xanthate is within the norms established for cellulose films. The shell made in this way is suitable for the production of cooked, semi-smoked and cooked-smoked sausages. It was found that the finished sausages have a good marketable appearance, the shell after smoking and drying shrinks and adheres tightly to the surface of the loaf, at the same time well removed from the loaf.

There is also known a method of obtaining a fibrous shell from paper tape, pre-impregnated with viscose and treated by cellophane. Production of paper-based shells with impregnation with adhesive composition are highlighted in our work too [2]. Sausage casings of this type have been widely used and continue to be used in Europe. The shells are designed for making cooked sausages. They are obtained from strong sodium technical non-glued paper as follows: the paper is impregnated with a warm protein adhesive composition, which is also used when gluing tubes from it.

After that, the shell is dried, and the layer of glue applied to the paper is then tanned with formaldehyde [3].

In Soviet times, the All-Union Research Institute of Meat Industry proposed a technological process for making sausage casings from technical paper. Technical paper for the manufacture of sausage casings must be unglued, tear-resistant, well absorb water with uniform distribution of cellulose sulfate fibers, have a thickness of not more than 0,12 mm and a weight of 1 m² not more than 80 g technical paper of domestic production, the most suitable for the manufacture of sausage casings are the following types - cable; insulating and impregnating mass of 1 m² from 60 to 80 g.

In the **conclusion** we need to explain the most economical type. The shell is made according to the following technological scheme:

1. *Cutting paper.* Rolls or reels of paper are cut by machine or by hand into sheets 55 cm long and a width corresponding to the manufactured diameter of the shell (50-65 mm), taking into account the width of the seam-10-12 mm.

2. *Bleaching paper.* In the case of dark paper, it is bleached with sodium hypochlorite with an active chlorine content in a solution of 1.0-1.5% to a light yellow color for 10-15 minutes After bleaching, the paper is immersed for 3-5 minutes in a bath with 5% sodium sulfate solution, and then washed with water. After rinsing in running water, the paper is placed on the feet for draining. Light yellow paper (insulating and impregnating and similar in color) is not bleached.

3. *Preparation of solutions for sizing paper.* Solutions for sizing paper are prepared as follows:

- solution A: 8 kg of crushed casein pour 60 liters of water and leave for a day for swelling. 1600 ml of 30% sodium hydroxide solution is added to the swollen casein with stirring and casein is transferred to the solution at a temperature of 35 – 40°C. Insoluble mechanical impurities and particles of casein are removed from the solution by filtering the latter through a copper sieve;

- solution B: 7 kg of gelatin and 6 kg of crushed glue made of food bone, pour 35 liters of water and leave for 4 - 5 hours for swelling. Then the mixture is heated to 50-60°C to obtain a homogeneous solution;

- solution C: to 10 liters of water add 1 liter of 30% sodium hydroxide solution. The solution is heated to boiling, after which it is gradually added with stirring finely chopped rosin in the amount of 2,5 kg. Heating is completed when the solution becomes clear.

4. *Tanning of the shell* is carried out in a bath with 3-4% formalin solution for 3-5 minutes or in the shower in a special chamber, where the frame together with the shells hung on it enters a closed dryer with a temperature of 30-35°C. Drying time - 3 - 4 year In the drying process there is a final tanning.

5. *Shell packaging*. The shell in packs of 50 pcs. wrapped with paper tape with a label and tied with twine. The finished shell is kept in a warehouse for at least two weeks, after which it can be used to make cooked sausages [4].

Sheets of parchment paper. Both white and colored parchment casings are used in sausage production. In the Czech Republic and Slovakia, a single layer of parchment cover is used. Sulfuric acid is used for its gluing, which, depending on the concentration and time of action on the parchment surface, causes more or less deep destruction of cellulose; cellulose decomposition products have adhesive ability [5].

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