

Intensification of meat raw materials heat processing at dietetic products manufacture

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A search for food products rational production is continuing all over the world. These products should meet the following requirements: available price, high nutritional and biological value, short cooking time. Undoubtedly, quick frozen ready-to-eat and ready-to-cook products fit the abovementioned requirements. The rate of their manufacture increases proactively in all countries. Meanwhile outstripping tendency nowadays has the manufacture of quick frozen ready-to-cook products of an increased degree of readiness: pies with cooked fillings, pizza, ravioli, minced meat in cabbage leaves ("Golubtsy"), etc. Meat components heat treatment is a principally important process of their manufacture. It should be carried out using continuous equipment and providing high quality of finished product. The specialists of the Moscow Technological Institute of Meat & Dairy Industries investigating and studying various methods of meat products heat processing have developed a device for continuous heating of meat for quick frozen pies dietetic fillings. Taking into account that combination minced meat is the basis of fillings it has been decided to combine operations of meat fine comminution and its cooking. A nozzle-cooker for a mincer has been developed for this purpose. It has a form of cylindrical chamber with distributed steam feeding through the system of jets. The nozzle is adjusted to the mincer. There is a screw inside the cooker for meat raw materials' mixing. For easy assembly nozzle-cooker is put on a truck. The device works in a following way. Meat (pork and beef) is fed to a mincer for comminution and then to the chamber of cooker. In the latter meat, at an intensive mixing, is treated with sharp steam at temperature up to 120°C. Finished product with the internal temperature no less than 75°C is fed to the section of filling manufacture. Proceeding from the results of structure-mechanical characteristics study and supervision for heat processing it is possible to propose the following way of raw material movement in the apparatus. Under the pressure of a mincer the product is moving in turn passage as a continuous stream rotating with the screw. Taking into account data on raw material sliding it is possible to propose that the stream slides the screw by the internal surface of the housing. The jets divide the moving stream onto elemental layers. As the stream condensates on the surface of elemental layers, heating the product, proteins denaturates, i.e. structure-mechanical properties change, and the element layers reaching the following jets are mincing. As the result the product if leaving the apparatus in the form of separate particles stream mixed with the broth. The latter consists of moisture, lost by the product at heating, condensate and fat. It is possible to think that every particle is performing complex movement: along the screw channel at the rate  $w_x$  and rotates with the screw at the rate  $w_{\phi}$ . Addition of the vectors  $w_x$  and  $w_{\phi}$  gives the resulting rate of raw material movement. To obtain raw materials' temperature similar to a heat-carrier steam temperature and to decrease apparatus's length it is advisable to maintain  $w_x$  10- and 100-times lower than  $w_{\phi}$ , thus sufficient raw materials' comminution and its uniform heating being achieved. Organoleptical evaluation of dietetic fillings made using steam-contact heating shows their high quality. A study into fillings quality characteristics after freeze chamber storage was specifically interesting, with the maximum storage period for quick frozen pies being 6 months at -18°C. The experiment showed 1-2-scores decrease of organoleptical parameters during storage period. Water content decreased by 1.5-2%. Slight fat oxidation was found, Bacterial load was  $10^3$  cells/gr (the same microorganisms' content was found immediately after steam-contact treatment). This testifies that freezing does not sterilize product but inactivates bacterial action. In total it is possible to conclude that 3-month fillings' storage at -18°C does not significantly influence their physico-chemical and organoleptical characteristics. As the result the technological instruction on quick frozen pies manufacture has been changed taking into account utilization of test-industrial equipment for fillings' heating in a stream. It is possible to use meat raw materials' steam-contact processing for a wide range of quick frozen products with dietetic fillings.