COMPLEX APPLICATION OF HISTOLOGICAL METHODS AND IMAGE ANALYSIS IN DEVELOPMENT OF MEAT-VEGETABLE PUREE TYPE PRODUCTS FOR INFANTS

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The problems of creation favourable conditions for life of children, their social protection in the period of reforms are reflected in the Presprogram "Children of Russia", which provides for the development of the industrial production of foods, i.e. solving the problems that will to meet the physiological requirements of children of earlier age in special products, creation and production of new foods. In connection this, the development and evaluation of untraditional formulations is necessary which could cover the deficiency of essential food substance childrens' diets both through the use of new sources of food raw materials and the enhancing the food value of products by the combination the components of the formulations, which is justified from the point of view of rational balanced nutrition. In connection with the above development of multicomponent foods based on meat raw materials with the aim to increase their range and decrease their cost is importance. Present-day scientific data suggest that children of earlier age must receive meat (beef, veal, poultry meat, non-fat pork) additional food, a value product, being an important source of proteins with high biological value and containing essential amino are favourable ratios for growing child organism. The meat is introduced into the diet as a puree. Fine grinding of meat makes it possible to the damage to gastro-intestinal tract of the infants, taking into account the peculiarities of the structure and the mechanism of suction of intestines and stomach mucosa.

Meat and meat-vegetable canned foods can serve as a basic form of meat foods in the diets of children, ensuring guaranteed by chemic composition, food value and sanitary safety of infants diets. These products must be used more widely under the conditions of unfavour ecological situation and inadequate hygiene culture of the population. Besides, use of meat and vegetable canned foods reduces time facilitates the process of preparation of foods for children.

This paper presents results of the development, on the basis of medical and biological requirements, of meat and vegetable purce type of (canned meat) for children of earlier age using the histological methods and computer system of image analysis for their quality evaluated degree of dispersity and structural arrangement and compliance of these attributes to standardized ones for purce-type canned foods for nutrition.

The objects of investigation were the samples of minced canned meat mass, that was ground in a grinder; in a grinder and colloidal million a grinder colloidal million a grinder colloidal million and in a grinder colloidal million and colloidal and in a grinder, colloidal mill and homogenizer, as well as the corresponding samples of existing canned foods for child nutrition. The sa investigated were: the canned minced mass based on meat with added vegetable components in different ratios according to formulation final purce-type canned foods manufactured on its basis. Quality evaluation of the developed products was accomplished with the use physical and chemical, rheological, microbiological and organoleptical investigations. In addition was used a histological method with analysis on computer system "Magiscan-2A" with the software "Jenias", adapted by the authors for the investigations of foods for nutrition. The samples of canned ground mass and final products after fixation in a 10% neutral aqueous solution of formalin and washing enclosed in gelatin according to commonly used method. Then histological sections with the thickness 10-20 mcm were made from material impregnated with gelatin on a freezing mission of the section of t impregnated with gelatin on a freezing microtome-cryostat. Histological sections were stained with hematoxilin-eosin, sudan-3 and 4 for differentiation of structural components of structural compo differentiation of structural components of ground meat and final product. Then the obtained histological preparations were microscoped magnification 6,3 X; 40 X of light microscope "Ienalumar" with the telecamera "Bosch", that were the part of a complex computer si "Magiscan-2A" (Joyce-Loeble). Larger components of the ground meat were studied on a macro viewing installation. Character micropictures were photographed in studying the histopreparations under the light microscope "Ieneval" with a photo extension with the purpose of demonstration of microstructural peculiarities of samples of ground meat and final products. The results of morphotic investigations of image analysis were obtained as the data of statistical and mathematical computer calculations: graphs, histograms, tables Histological and morphometric investigations of the samples of canned ground mass and ready products made it possible to deter characteristic features of their structural arrangement and microstructure as a whole depending upon the formulation and degree of grin the dynamic of structure formation of final products was evaluated. It was also established, that the samples of meat-vegetable g composition and final products, ground with the help of grinder and colloidal mill, had the best microstructure, featuring uniform, or ground mass (Fig. 1) with uniformly distributed starch, particles of groat, soya isolate, fragments of muscular, connective and fatty tissue fat drops), components of cabbage and carrots. Macroviewing analysis has shown that the size of the particles of ground meat was not g than the standardized - 1.5 mm and on the average was 500 mcm, and during microscopic analysis was 255 mcm (Fig. 2), with the average of fat droplets - 5-8 micrometres. Histological and morphometrical analyses have shown that the optimum degree of grinding and ratio of and meat components was reached and a dense and stable structure of minced meat with stable interior bonds between its components created which facilitated water binding, confirmed by rheological investigations. All that resulted in obtaining high quality characteristic final products with the desired dispersity and consistency of the children' foods.

<u>Conlusions:</u> 1. A histological method together with image analysis has clearly shown a microstructure of products and presented a th objective information (that is needed for food technologists) about paricle size than that which could be obtained using the method ^{stell} through a set of sieves, or extruding the comminuted meat through the dies according to approved techniques.

2. Complex application of histological methods and image analysis has helped to obtain optimum ratios of structural components comminuted foods in case of correspondence of their size to those prescribed, which to the best advantage distinguished the developed more thank to the best advantage distinguished the developed more thank to the investigations carried out, medical and biological requirements to puree-type meat and vegetable canned foods, composition and formulation were scientifically based and developed. Their technology was introduced at Voskresensk plant of Foods Child Nutrition.

4. Accumulation and analysis of data about microstructural characteristics of the products for child nutrition with the use of computer s¹⁵ of image analysis allowed to come to forming of qualitative characteristics of the objects of investigations by their morphometric indices.

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Fig. 1. Microstructure of meat-plant puree-type canned foods. Ready product

Fig. 2. Histogram of image analysis of histological preparation of meat-plant pure-type canned foods (ready product) under microscope. Distribution of the values of ground meat particle size.