

NEW WAYS OF RATIONAL USE OF SLAUGHTER ANIMALS BLOOD FOR FOOD AIMS

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Background

Blood of industrial animals is the object of close attention of scientists and practitioners. It is connected with the known properties of proteins, diversity of chemical substances and functionality of pigments in technological schemes. Of total volume of blood produced, about 10 % is used for fodder aims, above 50 % for food, about 25 % for medicine and about 15 % in microbiological industry. Nutritive values are very high: 10 kg of plasma can replace 40 kg of pork or about 150 chicken eggs.

However real volumes of its use for production of food products are not large taking into consideration its high mass share of useful proteins, physiologically active peptides, hormones, vitamins, lipids and etc. Blood potentials have large opportunities in creation of therapeutic-prophylactical and special food products [1, 2].

To meet the needs of consumer properties and to wide the assortment of such products it is necessary to create new original approaches to the treatment of the raw materials on the basis of study and realization of physico-chemical and biochemical mechanisms.

Objectives

Stabilized food pig and cow blood; fractions of form elements (FE) and plasma; ferment preparations of proteinases from *Bacillus megaterius*, pure cultures of lactic acid bacteria.

Methods

Evaluation of properties of protein systems was carried out by the spectrophotometric method in the range of wave length 230-400 nm on the spectrophotometer CФ-46, dynamic viscosity on the viscosimeter Reotest 2.1 at 20 °C, the index of protein quality at the hydrolysis by digestive ferments in tests in vitro and on animals in vivo, the quality of ready made products according to the requirements of standards for the production of such assortment, pH – potentiometrically, the amino acid content by the automatic aminoanalyser AAA-881.

Results and discussion

Complete processing of the animal blood upon the preliminary isolation of main fractions – plasma and form elements (FE).

Taking into consideration the early age children, teenagers and women deficit of iron [3], the fraction of form elements has the interest for the development of original products of various technological forms: protein-fat additives, glazes, pastes imitating the chocolate, concentrates, instant drinks of coffee type and etc. It is shown that for destruction of cellular membranes of the form elements is effective to use ferments and acids including the medium attenuation. Hemolyzate – the universal semi-finished product [4], at combination with the other food components it is possible to reach a considerable diversity of products with the given composition and properties (Fig. 1).

The addition of the ascorbic acid and tocopherol creates the conditions for prevention of oxidative processes and stabilization of products at storage. The products have a high level (89-97 %) of digestibility, limited only on two amino acids, their reological characteristics do not practically differ from natural products. The experiments on evaluation of the antianaemic activity have been carried on white rats of three months old with the body weight (198±20) g at feeding with new products. Anaemia is caused by nitrates.

It is shown that the mass share of hemoglobin, methemoglobin, the number of erythrocytes, iron in blood was rapidly reconstituted, mass share of iron in the liver of animals eating new product increased and played the role of depot, which guaranteed the rehabilitation of the body without status changes.

In the frame of the problem of the blood rational use, of some interest is the investigation of mechanisms of structuring and stabilization of proteins under the influence of physico-chemical factors [5]. It has been established that the application of the fermentative hydrolysis under the influence of proteinases causes the active degradation of proteins with the formation of low molecular fragments and amino acids. Protein molecules stabilized in the solution have the speed 2,5 times increasing the speed of digestibility and assimilation, and are a good basis for the production of protein drinks, parenteral and probe nutrition.

The other, not less important trend of maximum use of plasma at the food production is the creation of gelatinous products with various consumer and special properties.

The mechanism of blood plasma structuring is not studied enough. It was been established that viscosity system increases sharply at the influence of temperature, pH, some ions, additives including polysaccharides and gelatin. Of practical interest is the establishment of the mechanism of structure formation under the temperature increase with participation of the serum albumine. The albumine molecule is the least on size and molecular mass, however the function of the protein are varied and unique.

There is no much information about its structure, but it is known that a protein globule is assymmetric and has a stretched ellipsoid of rotation. Isoelectric point lies in the limits of pH 4,3-4,8 besides the molecule has approximately 100 pairs of charges, and at pH 7,4 the albumine has about 180 of titrated changes upon the molecule.

The albumine has 19 amino acids in its content at prevailing share of aromatic ones. It is suggested that the albumine molecule consists of individual globular domains formed by a single polypeptide chain. The functions of the albumine are varied. It bonds ions of metals including hard ones, colorants, neutralizes toxins of various origin, stabilizes concentration in plasma of steroid hormones, tryptophane, ions of calcium, forms complexes with the therapeutic preparations. The unique property of the albumine lies in its ability to make complexes with organic ions, colorants due to the formation of zones by separate parts of the molecule, which complimentary to the bonded ion.

The presence of numerous functional groups, the participation of the albumine in plasma structuring. On the basis of the study of absorption spectra in the range of waves lengths 230-400 nm on the CФ-46, it has been established that the increase of temperature, beginning which 40 °C leads to the growth of contact chemical groups and to provocation of structure formation.

The change of pH into acid of alkali zone, addition of hydrocolloids, ions of calcium increases the speed of the process and gel strength. The selection and application of flavouring matters, aromatizes, sweetenes, colorants of the known chemical nature including natural ones, creates wide possibilities having therapeutic-prophylactic effect and good consumer qualities for wide layers of population including children.

Application of biotechnology methods allows to produce biomodified food system on the basis of plasma fermentation by lactic acid and bifidobacteria. Possessing the complex of the most valuable food and biological qualities, such products have a good structure, taste and flavour.

Conclusions

On the basis of plasma of slaughter animals we have developed pastes, sour drinks, deserts. Such products are useful for the improvement of the immunity, stimulates the activity gastric organs, normalizes the nitrogen balance and processes of metabolism, supply biologically active substances. It is useful for health of a wide range of population including children and elder people and at rehabilitation of post-operation and burned patients.

Pertinent literature

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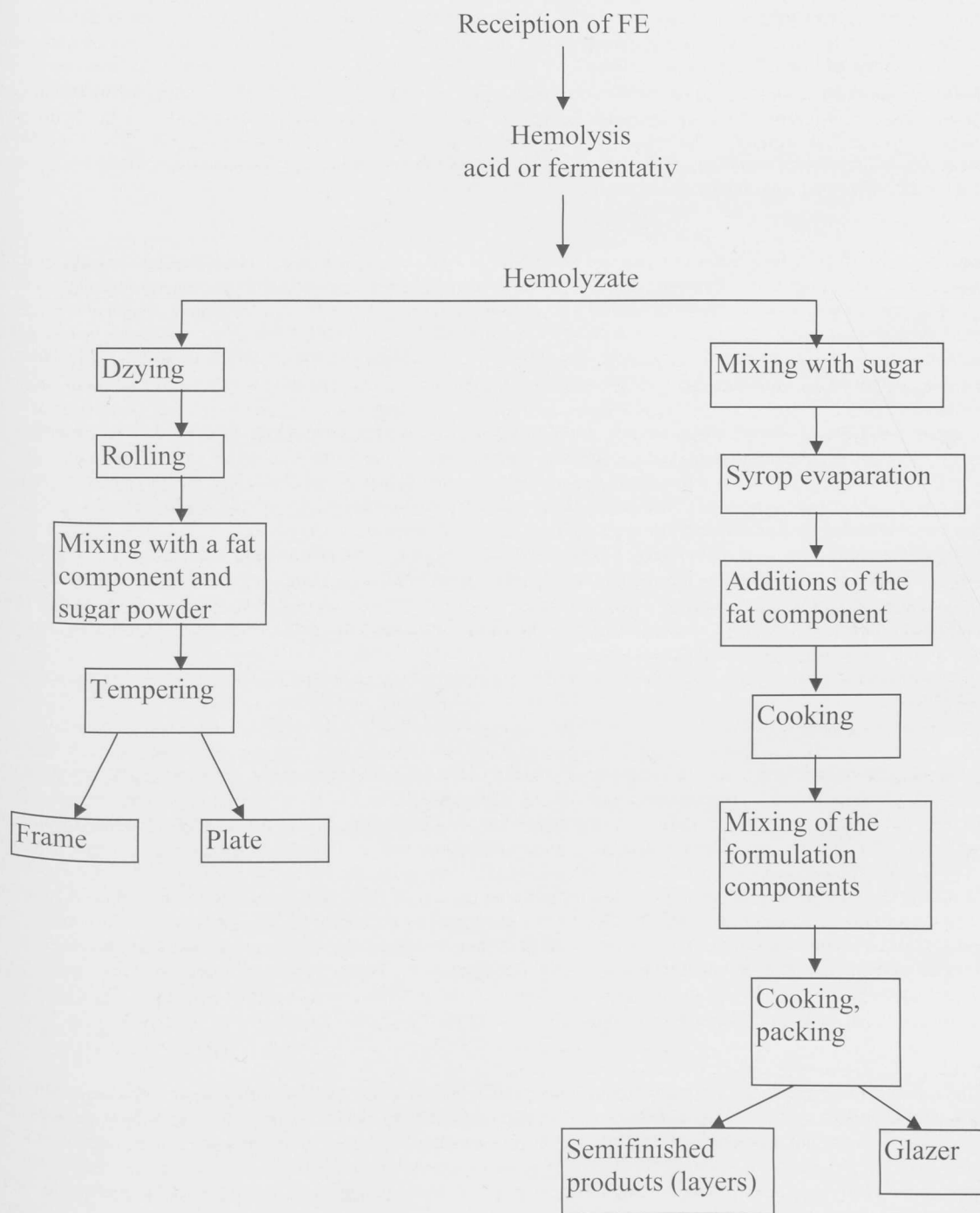


Fig. 1. The scheme of production of antianaemic products similar to confectioneries