FERMENTATIVE HYDROLYSIS AS THE EFFECTIVE WAY OF OBTAINING THE BASE FOR DISEASE-PREVENTIVE DRINKS

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Introduction

Nutrition of the population serves the determining factor of preservation the genfund of a nation, strengthening of health of the people and prevention of different diseases.

The most important problem in providing high valuable nutrition is to supply diet with necessery quantity of proteins including animal ones. However, modern level of production of the animal proteins all over the world lags behind growing needs for it. To restore the protein deficiency in modern technologies special attention is paid to the problem of low waste and waste less processing of secondary by-products of cattle slaughter and involving them in the basic manufacture. Blood plasma and creation on its basis a wide assortment of a spectrum of products of the increased food and biological value, high consumer demand are of great interest.

The plasma of blood is an ideal basis for creation of products enriched by protein of high biological value, which is easily digested and assimilated. Chemical structure and organoleptic parameters confirm an opportunity and expediency of use of plasma in creation of a liquid basis for manufacture of drinks of special, disease-preventive and general assignment enriched by high-grade easily digestive protein, biologically active substances.

To increase transparency and stability of a liquid basis for obtaining natural protein of drinks we suggest to use fermentative hydrolysis, deeply touching the structure of proteins increases solubility of system, increasing assimilation and digestibility of products.

Objects and methods.

During experimental work we used blood plasma of slaughter animals, and applied preparations, (produced by home industry) as enzymes. For achievement of the greatest possible degree of proteins destruction it is necessary to carry out hydrolysis at optimum values of pH and temperature, which were determined experimentally on standard substrate – sodium caseinate.

Methods.

Proteolytic activity of fermentative preparations was determined by the modified method of Anson. Amino acid composition of blood plasma we determined by a method ion exchange chromatography. Assimilation of products by digestive ferments was determined on a Pokrovsky-Ertanov method.

Results and discussion.

At valuation of hydrolytic properties of preparations based on plasma proteins we established, that the greatest quantity of free amino acids is formed at use of a preparation from liver of crabs - collagenaza (Tab. 1), that was the main criterion at a choice and further use of this preparation for practical purposes.

The rational conditions of protein hydrolysis of blood plasma by a preparation collagenaza are established: a ratio plasma:water = 1:1; dosage of a fermentative preparation 0,35-0,45 % to total mass of a reactionary mixture; pH medium 6,8-7,2; temperature 37-40 °C; time of hydrolysis - 3 h. Fermentative preparation was added in the form of solution. For this purpose we dissolved batch weight in a minimal volume of water and mixed a mixture. Hydrolysis proceeds intensively during the first 30 min after adding a preparation. Then, gradually the rate of hydrolysis increased and after 2 h decreased and by 3 h the level of products accumulation of the hydrolysis remains constant.

The important technological moment at the manufacture of natural drinks is their microbial neutralization, which in practice is achieved by pasteurization, resulting in destruction of vegetative forms of microorganisms. Study of an opportunity of combining processes of pasteurization and inactivation of enzymes is of some interest. In practice we applied thermal processing taking into account temperature limits of the protein denaturation. As the results have shown plasma protein treated with enzyme, save solubility in a temperature interval 53-54 °C. At the further increase of temperature denaturation of residual highmolecular fractions of protein substances with their subsequent coagulation and forming of flocculation of sediment take place. The addition of sugar to hydrolysate promotes the increase of temperature of the protein denaturation up to 56 °C, that is connected with known stabilizing action of sucrose and its protective effect in relation to proteins.

Amino acid composition of pasteurized and hydrolyzed plasma is shown in the tables 1 and 2. As we can see from the Table 1 the composition of free amino acids is rich in essential components, their score is as much as possible approached to ideal (except for essential amino acids - isoleucine) (Tab. 2). Assimilation of a product by digestive ferments is 0,98. Liquid basis obtained we used at manufacturing of soft drinks from natural protein raw material of the animal origin. Developed formulations are easily applicable in practice, the drinks have pleasant taste, color, smell, are enriched with biologically high-grade and active substances and can be used as disease-preventive diet for children and people with diseases digestive organs, patients after operation.

Table 1

Mass share free amino acids in hydrolyzeted of blood plasma

Amino acids	Mass share (mcmoi/i) in gidrolizate with fermentative preparations	
	collagenaza	megaterin
Asparagin acid	2323,4	591,49
Treonin	421,05	312,93
Serin	1680,00	400,00
Glutamin acid	2860,00	623,66
Prolin	2142,86	571,43
Glycin	1089,10	376,24
Alanin	3200,00	1085,71
Valin	1719,75	738,85
Cystin	511,10	311,10
Metionin	863,64	363,64
Isoleucin	756,76	356,76
Leucin	3289,62	2284,15
Tyrosin	2290,06	752,14
Phenilalanin	2789,47	863,16
Lysin	3009,71	1048,54
Gystidin	850,00	225,00
Arginin	3125,00	750,00

Table 2

Amino acids composition and score on the basis of blood plasma

Amino acids	Apple drink		Cherry drinc	
	mass share, %	score, %	mass share, %	score, %
Asparagin acid	6,0		5,6	
Treonin	5,9	98	6,4	110
Serin	4,6		4,8	
Glutamin acid	8,6		8,6	
Prolin	3,6		7,4	
Glycin	3,2		4,2	
Alanin	4,0		3,8	
Valin	4,0	80	4,4	88
Metionin	1,6	112	2,0	119
Isoleucin	2,4	60	2,8	70
Leucin	6,2	89	8,4	120
Tyrosin	2,2		1,4	
Phenilalanin	3,6	100	5,2	110
Lysin	7,4	123	8,2	160
Gystidin	2,6		3,0	
Arginin	3,4		4,2	