Technology of products of meat cereal origin adequate to the specificity of a feed with the hemopoiesis disturbances of iron deficient character

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Abstract

The creation of foodstuffs that are nutritionally adequate to the nourishment specifity of different people is one of the main trends of the modern food technology. The aim of the researches was to work out the technology of meat cereal foodstuffs. The recipes of these foodstuffs were projected and optimized on the basis of scientifically substinated recommendations and calculated by the linear programming and computer simulation methods. The nutritional adequacy for the functional nourishment of people suffering from and predisposed to iron deficient anaemia was taken into account.

The researches of the elaborated foodstuffs are evidence of high meanings of protein and minimum amino acids coefficient utility that prove their high biological value. The foodstuffs contain a great quantity of polyunsaturated fat acids (linoleic, linolenic, arachidonic). The ratio w 6/ w 3 is, 10:1. The analysis of fat acids composition to the ratio of NGK, MNGK and PNGk, R_{Li}= 1 … 3 sums, NGK, MNGK and PNGK sums with the regard for linoleic, linolenic and arachidonic acids balance R_{Li}= 1 … 6 prove the high meanings of fat acids balance factors.

The positive dynamics of biochemical and morphohaemotological animals' blood tests proves the efficiency of use of foodstuffs for the preventive measures of hemopoiesis of iron deficient character disturbances. The highly bioaccessible composition of foodstuffs in microelements allows to mobilize compensatory reactions of organism very quickly.

Introduction

The problem of anemia is the one of the serious problems not only in Russia but also in rest if the world. Even internal forms of anemia which lead to chronic ones are of great concern.

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Basic meat ingredients of pate (ram's liver, heart and lungs and hen's liver, heart and stomaches) are chosen according to the analysis of their nutritional value and nutritional adequacy on the basis of SSR. The choice of chick pea as a vegetable component is conditioned by the high protein content (24-30%) balanced in aminoacid composition, rich in macro- and microelements, vitamins. In connection with the problem of GMP-raw materials highly productive and drought resistant chick pea is an alternative to soya and soya products. Made researches of samples showed that chemical composition of pate is equivalent to chemical composition of samples and corresponded to SSR (Table 1).

Table 1. Chemical composition and energetic value of pate samples

Indicator, mass share, %	SSR	Pate «For your health»		Pate «Exquisite»	
		M	S	M	S
Moisture	-	47,75	1,81	47,08	1,79
Protein	12-18	15,50	0,03	15,36	0,03
Fat	9-12	9,53	0,05	8,85	0,04
Carbohydrates	20-25	23,62	0,05	23,31	0,05
Ach	-	2,60	0,01	2,40	0,01
Energetic value,kl/cal	225-250	242,3	-	234,3	-

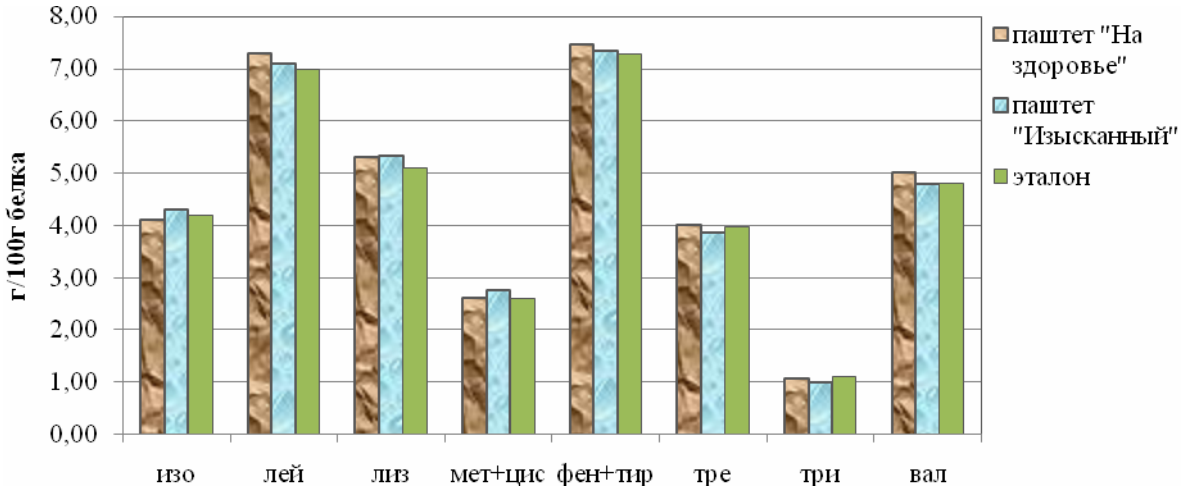

Figure 1. Aminoacid protein composition of samples of the product and standard.

Aminoacid compositions of protein of samples are represented in the 1st pattern in comparison with designed meanings. Analysis of histogrammes shows that amino acid composition of proteins of samples is equivalent to the standard.

Indicators analysis of worked out pate balance according to amino aced and fat acid composition (Table 2) confirms accordance of designed virtual samples and nutritional adequacy to the nourishment specify of young people predisposed to anemia. Correlation of ω_6/ω_3 fat acids is close to designed correlations and is 9,14 and 9,37.

Table 2. Indicators of nourishment balance of samples

Indicators		Pate «For your helth»	Pate «Exquisite»
Aminoacid balance			
Min. speed share/ unid (C_{min})		0,90	0,73
Waste factor (σ)		0,71	0,70
Excess factor, g100 g protein (U)		8,94	11,56
Fat acid balance			
Correlation ω_6/ω_3		9,14	9,37
Fat acid balance factor, share/unid (R_{Li})	*I=1…3	0,90	0,82
	**I=1…6	0,70	0,74

*I=1…3 – balance ∑НЖК, ∑МНЖК, ∑ПНЖК

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Microelement composition researches of worked out product showed the following results: iron – 90 mg/kg, zinc – 181,3 mg/kg, copper 17,1 mg/kg, selen – 0,093 *mkg*/g. Taking into account daily norms of a person's consumption of microelements, 100gr of meat cereal pate with chick pea satisfies iron consumption for 50-70%, zinc – 90%, copper – 66%, selen – 15 – 20%. Quantitative content and correlation of iron, zinc and copper in the product allow to recommend these pates for nourishment of people suffering from anemia. Correlation of single elements (Ca and P) is close to optimal formula of balanced nourishment.

Biological value and prophylactic effect of worked out meat cereal pates were tested on Wistar rat-males which weight was 200-220 gr. There were 4 groups of animals (Table 3), 12 animals in each group. The first group was consisted of healthy animals. Animals of the 2d, 3d and 4th groups suffered from artificially caused anemia by injecting "Trion-B". Animals of all 4 groups had a usual ration: 25 gr. Of mixed feed and 15 g of pearl-barley per 1 animal but in the ration of 3d and 4th groups of rats tested pate samples on a basis of ram and hen mixed feed were being put accordingly with addition of chick pea: 15 g/100 g animals weight a day.

Table 3. Animals groups participating in the experiment

Group characteristics	I group (control)	II group	III group	IV group
Quantities of animals in a group	12	12	12	12
Animal condition at the beginning of the experiment	здоровые	anemia	anemia	anemia
Ration	usual	usual	usual + ram pate	usual + hen pate

The experiment lasted 22 days before injection the preparation and on 2; 8; 22; test days, hematological and biochemical blood research here made, clinical observation for animals were made to control animal's weight and condition. Solid blood was tested to determine hemoglobin, leucocytes and erytrocytes quantities on a hematological analyzer "Hema Screen 7", trombocytes by a unification method accepted in clinical practice. In dab's blood (according to Romanowski–Gimza) was being determined leucocytes formula. Speed settling down of erytrocytes was determined according to Panchenkov formula. In blood it was determined: protein level, iron, Ca and general iron connecting ability of whey content with the help of reagents "Diakon-DC" on a biochemical analyzer "StatFax 3300".

Comparative dynamics of some blood indicators during the experiment

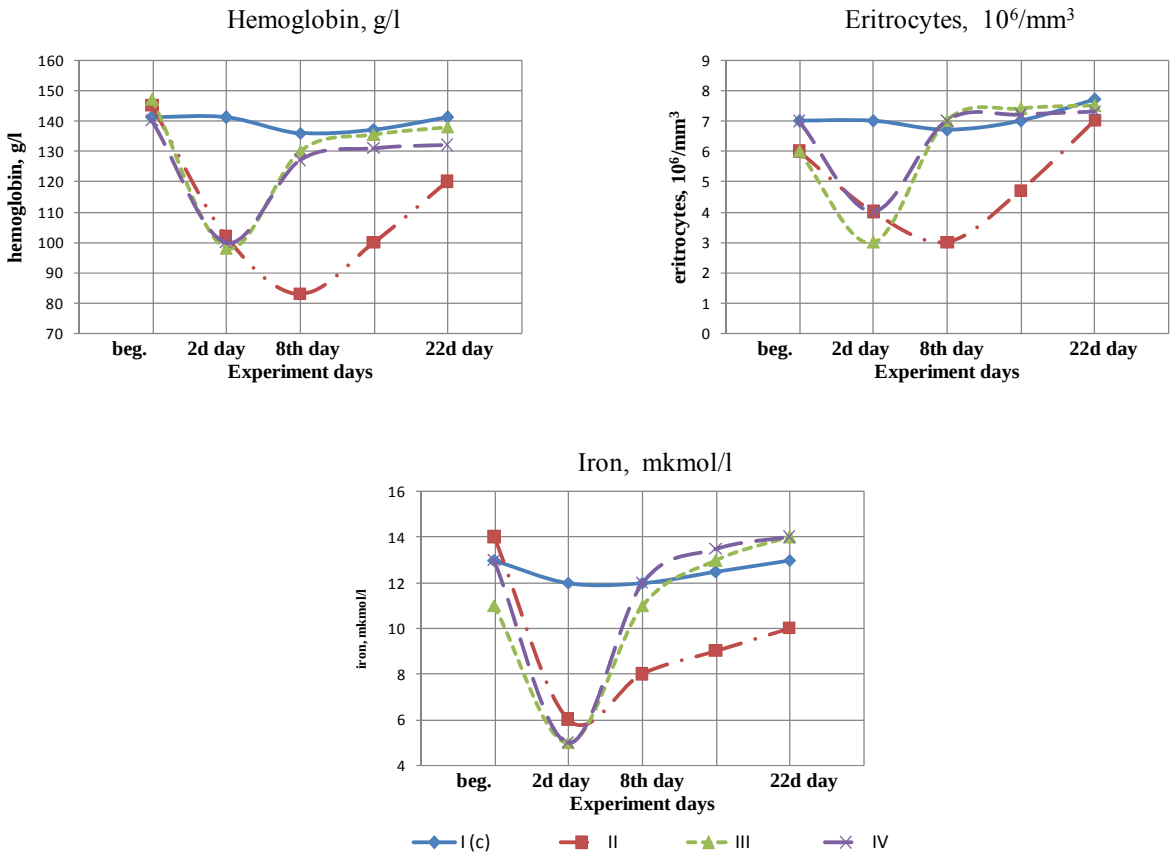

Figure 2. Hematological blood indicators dynamics of laboratory animals.

Pathology-anatomical research of digestion, blood circulation, liver, respiratory and urinary system of tested animals of all groups didn't reveal any external symptoms of any pathological or inflamed processes after the experiment.

These products didn't have negative influence on clinical dynamics of animals' metabolism. Made researches showed that these pates with chick pea may be used as a treatment of hemopoiesis disturbances of iron deficiency character. Micro elemental composition of these products has rather high bio access that allows to mobilize compensative body's reactions quickly.