

THE TECHNOLOGY OF PANCAKES WITH BALANCED AMINO ACID COMPOSITION

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The article systematized and provides general information about nutrition for people with protein deficiency. Proved and developed technology of pancakes with functional purpose and the main indicators of their quality are presented.

Nowadays there is a deficiency of protein consumption in the world. Approximately half of the 6 billion population of the Earth suffer from lack of protein. People consume in average 60g of protein per day, at a daily rates of 70g. According to the Institute of Nutrition RAMS (Russian Academy of the Ministry of Science), consumption of animal protein products has decreased by 25-35% since 1992 and therefore consumption of the food high in carbohydrates (potatoes, bread products, pasta) has increased. The average rate of protein intake has lowered to 17-22 % - from 47.5 to 38.8 g/day for animal protein. In low-income families the intake of total protein per day does not exceed 29-40g. The total protein deficiency in the world is estimated at 10-25 million tons per year.

Analysis of the current state of health in Ukraine shows that animal protein deficiency causes an inadequate consumption of three essential amino acids such as tryptophan, methionine and valine.

Methionine is one of the most important nutritional component that cannot be synthesized by an organism. It prevents fatty liver disease, assures liver and kidneys regeneration, helps to prevent atherosclerosis and takes part in the synthesis of adrenaline, creatine, nucleic acids and taurine. In humans methionine converts to cysteine, that is a glutathione precursor, who has the fundamental importance for decontamination of toxins and liver protection. Methionine protects from the effects of radiation and has the capacity to form bonds with metals, such as lead, mercury, cadmium and remove them from the organism. It has a strong antioxidant effect, because it's a source of sulfur, that inactivates free radicals. Sulfhydryl groups of methionine protect cells from substances, that pollutes the air, and transport selenium and zinc through the body.

Tryptophan takes part in keeping the nitrogen balance at metabolic processes, production of growth hormones by hypophysis and in synthesis a range of biologically active substances: nicotinic acid, serotonin, melatonin and others. Nicotinic acid synthesized from tryptophan, is an important component in energy metabolism. Tryptophan as the precursor of serotonin has anti-depressant effect, contributes to disappearance of anxiety, insomnia, chronic fatigue syndrome, and promotes healthy sleep.

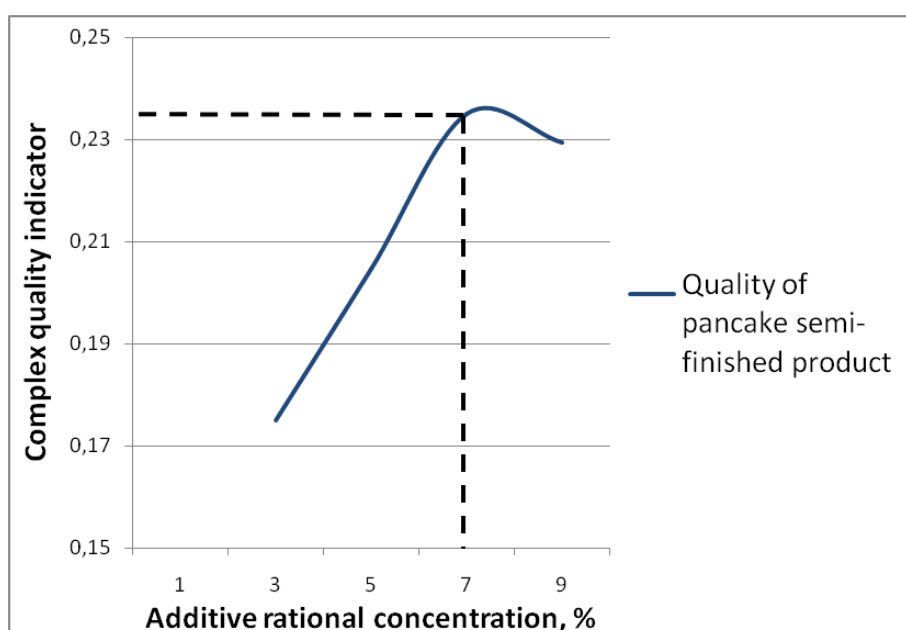
Valine is necessary for metabolism in muscles, tissue damage recovery and maintaining the nitrogen balance in organism. It plays a strong role in treating depression, helps to prevent neurological diseases and treat sclerosis, as it protects the myelin membrane surrounding nerve fibers of cerebrum and spinal cord. It prevents serotonin reduction, lowers the level of sensitivity to pain, regenerate tissue in liver disease. A lack of valine causes the loss of coordination and increases skin sensitivity to varied irritants.

The problem of food amino acid balance can be solved by adding marine mollusks protein concentrates, especially mussels and rapana ones, obtained by hydrolysis, such as "Rapamid" hydrolyzate. This product contains more than thirty biogenic micro- and macronutrients, more than 20 amino acids (including all essential ones), essential polyunsaturated fatty acids, taurine, simple peptides and various vitamins complexes. Application of this hydrolyzate has a positive impact on inflammatory processes in organism by reducing the number of

lymphocytes, increases hemoglobin content and normalizes the chemical composition of blood, restores and enhances physical performance.

This work represents the use of "Rapamid" hydrolyzate for cooking pancakes with various stuffings that can be added to the diet of people suffering from protein deficiency. The quantity of rational concentration of dietary supplement was determined by analyzing organoleptic characteristics of the semi-finished pancake model compositions with adding "Rapamid" in amount of 5 - 9% to the weight of milk. All the indicators were estimated on a five point scale. The selected limits are based on the necessity of enriching the dish with protein, nutrients that are important for people suffering from protein deficiency and considering their physiological needs.

The research results established that the use of the hydrolyzate in quantities more than 7% causes deterioration of organoleptic evaluation of pancakes. The comparative analysis of complex quality indicator, based on amino acids digestibility level and essential nutrients contents, revealed that the rational hydrolyzate quantity is 7.07g (7% to the weight of milk) (Graph 1).



Graph 1. Complex quality indicator of rational concentration of dietary additive for the pancakes semi-finished product

Stuffings for the semi-finished pancakes, enriched by essential nutrients and amino acids, were developed. Complex quality indicator of stuffings and determination of rational concentration of dietary supplement were based on organoleptic evaluation and macro- and micronutrients contents. It is equal to 4,8 grams for the cabbage stuffing (4% of the mass of cabbage), and 6,2g for the buckwheat (12,4% of the mass of buckwheat).

According to results of the search the technology of pancakes "Sarazan" with buckwheat and pancakes "Repoyo" with cabbage was developed.

Amino acid score of the finished product is given in Table 1.

The comparison of cooked dish with the control sample has shown that the amount of selenium increased by 46,1 / 37,6%, potassium – 9,8 / 8,2 %, calcium – 23,6 / 25,1%, iodine – 196,8 / 165,8%, niacin – 46,6 / 7,8%, folacin – 10,5 / 28,8%, vitamin C – 8,4/ 8% for the pancakes "Repoyo" /"Sarazan" accordingly.

Table 1

Amino acid score of pancakes with functional purpose

Denomination	Control 1		Pancakes "Repoyo"		Control 2		Pancakes "Sarazan"	
	mg	%	mg	%	mg	%	mg	%
Isoleucine	21,2	53,0	38,4	96,0	28,2	70,0	40,8	102,0
Leucine	36,5	52,0	89,2	127,0	48,4	69,0	87,0	124,0
Metionyn + cystine	16,5	47,0	99,5	284,0	20,9	60,0	81,8	234,0
Lysine	22,5	41,0	77,2	140,0	32,9	60,0	73,0	133,0
Phenylalanine + tyrosine	39,2	65,0	125,3	209,0	52,1	87,0	153,9	256,0
Threonine	17,2	43,0	54,6	137,0	24,9	62,0	52,4	131,0
Tryptophan	5,4	54,0	18,6	186,0	8,9	89,0	18,6	186,0
Valine	23,0	46,0	57,4	115,0	29,7	59,0	55,0	110,0

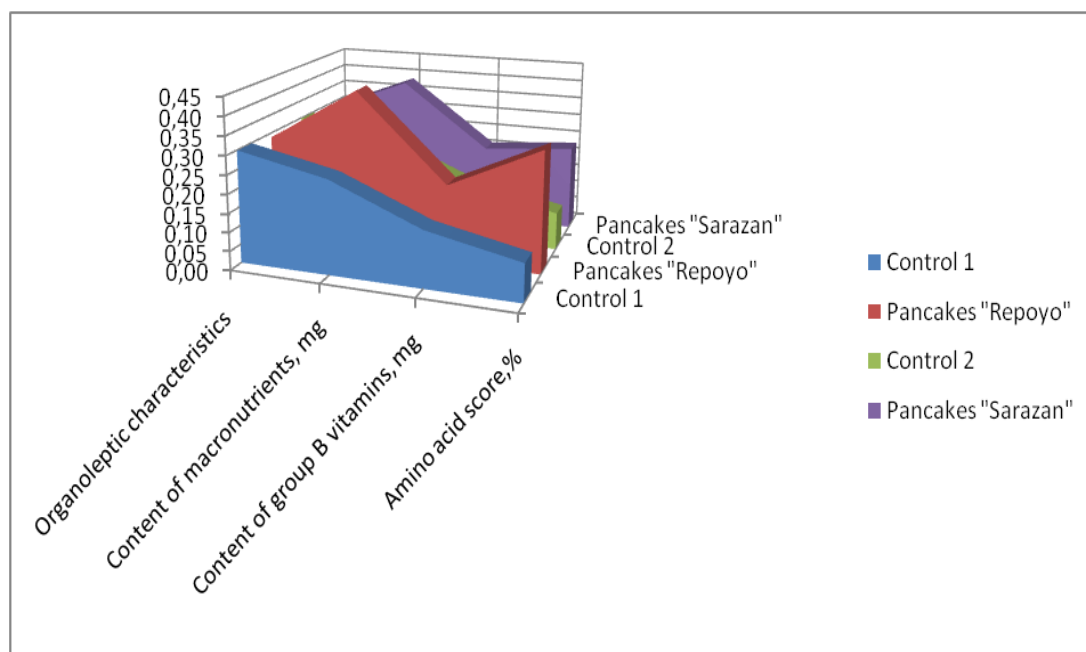
The percent of daily value intake of micronutrients, macronutrients and vitamins is given in Table 2.

Table 2

Daily requirement ensuring level for micronutrients, macronutrients and vitamins

Title of nutrients	Daily intake level	% DV	
		Pancakes "Repoyo"	Pancakes "Sarazan"
Na, mg	1300	47,8	52,1
K, mg	2500	17,8	23,2
Ca, mg	1200	17,3	18,3
Mg, mg	300	14,8	66,1
P, mg	1200	14,0	30,4
Fe, mg	15	515,6	536,7
I, mcg	200	29,9	26,8
Se, mcg	50	51,1	65,6
Vitamin A, mg	1000	1,8	1,8
Vitamin E, mg	15	15,9	15,4
Vitamin B1, mg	1,5	9,3	21,3
Vitamin B2, mg	1,8	15,0	18,9
Folacin, mcg	200	5,9	7,0
Niacin, mg	20	14,0	24,1
Vitamin C, mg	80	81,2	10,6

According to the results of the calculations a complex quality indicator of pancakes with functional purpose increased by 30% for pancakes "Repoyo" and by 31% for pancakes "Sarazan" in comparison with control (Graph 2).



Graph 2. Complex quality indicator of pancakes with functional purpose in comparison with control

Summarizing the results of the search, developed pancakes with balanced amino acid composition can be considered to be the functional purpose dish. Containing a high content of essential amino acids, minerals and vitamins it can be recommended for diet of people suffering from protein deficiency. The dish has a high quality grade, that indicates its usefulness and competitive ability.

Технология блинчиков со сбалансированным аминокислотным составом

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