



BIOLOGICAL VALUE OF SOFT CHEESE

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Article history:	Abstract:
Received: 20 th August 2021 Accepted: 11 th September 2021 Published: 14 th October 2021	The paper studied the amino acid composition of proteins and the qualitative composition of free amino acids of soft cheeses received by new technology. The results of calculations of the amino acid score are shown by the originality of the cheese of the cheese with indispensable amino acids and their high biological value.
Keywords: Milk, serum, thermal acid coagulation, soft cheese, amino acid, amino acid	

INTRODUCTION.

Based on scientifically grounded nutritional norms, the need for proteins per person is 90-100 g per day. The share of proteins of animal origin should account for 55%. All countries of the world experience a protein deficiency in the diet of the population. Substantial reserves of milk protein are contained in low-fat milk raw materials. They contain the entire set of amino acids, including essential ones, and their ratio in these proteins has been selected by evolutionary selection so that it meets the needs of the human body for good nutrition.

Usually, in ripening cheese, the cheese mass under the action of enzymes secreted by lactic acid bacteria undergoes biochemical transformations, which determine a specific taste, smell, color and pattern in the cheese. The breakdown of proteins in ripening cheese leads to the accumulation of numerous and diverse nitrogenous compounds: water-soluble proteins, polypeptides, peptides, amino acids and deeper breakdown products (amines, free ammonia). In fresh cheeses, the processes of protein breakdown are not very intensive, however, the study of the initial amino acid composition of cheeses is of certain scientific interest. In scientific data, there are many reports on studies of the general amino acid composition of soft Adyghe type cheeses. In particular, the results of the calculation of the amino acid rate carried out by OA Suyunchev showed the high biological value of the proteins of the "Adyghe Alpine" and the Adyghe cheeses, for all essential amino acids the rate increased by 100% [1]. According to T.N. Ryzhkova and others in the pilot batch of goat cheese "Orion" produced by the new technology, the mass fraction of protein (total protein), including essential amino acids, was 2.21 and 1.5% more, in comparison with similar indicators in the control batch soft goat cheese "Adyghe" [2]. However, the free amino acids in soft cheeses are not well understood. The purpose of our research was to study the amino acid composition of a new soft cheese developed by the authors, produced by complex coagulation of milk proteins.

MATERIALS AND METHODS.

The content of total and free amino acids in the experimental and control cheeses was determined on the "Hitachi 835" amino acid analyzer (Japan) in accordance with ISO 13903: 2005 "Composite animal feed. Determination of amino acid content". The investigated products were obtained using a new technology with thermos acid coagulation of heat-treated milk proteins at 75 - 85 ° C. The experiments were carried out in a cheese dairy - pasteurizer model SP 35.02V.00.000 installed in the laboratory of the Samarkand Institute of Veterinary Medicine as follows. The initial raw materials (skim and normalized milk with a fat mass fraction of 1.1%), in order to maximize the extraction of milk proteins, were heat treated at a temperature of 95 ° C with an exposure time of 5 minutes. Control versions of soft cheeses were obtained using the same technology as the experimental ones, but with coagulation of milk proteins at the pasteurization temperature. Curdled with acidic milk whey at 75 - 85 ° C for 5 min. After separating the whey, self-pressing in molds for 60 minutes and salting with dry salt, the resulting protein mass was subjected to research.

RESULTS AND DISCUSSION.

The analysis of the conducted studies showed that all the studied samples of soft cheeses are rich in both the quantitative and qualitative composition of amino acids. The proteins of all types of cheeses contain 17 amino acids: aspartic acid, threonine, serine, glutamic acid, proline, glycine, alanine, cysteine, valine, methionine, isoleucine, leucine, tyrosine, phenylalanine, histidine, lysine and arginine; their greatest content is accounted for by glutamic acid, leucine and proline. Both the content of individual amino acids and their total amount in the experimental cheeses are less than in the control ones. This, apparently, is due to the fact that the experimental versions of cheeses have an increased mass fraction of moisture.

All essential amino acids were found in the proteins of the studied samples of soft cheeses (tryptophan did not determine and). The total amount of essential amino acids in the proteins of the studied cheeses is 36.38 - 39.63%, and their amount is practically the same in the experimental and control cheeses. Our data are in good agreement with the studies carried out by TP Pavlenkova et al., Which found that the total amount of essential amino acids in the proteins of the Adyge cheese is 37.7% [3].

From the obtained data on the composition and content of free amino acids of the studied samples, it follows that the absolute amount of free amino acids in the experimental and control variants of low-fat and with a mass fraction of fat (ppm) in dry matter of 20% cheeses is not the same. So, the total amount of free amino acids in the experimental and control fat-free and with megajoule. in dry matter, 20% cheeses amounted to 11.5, 8.96, 11.3 and 8.34 mg per 100 g of product. The relative increase in free amino acids in the tested fat-free and with megajoule. in dry matter, 20% soft cheeses are 128.3 and 135.5% in comparison with the control ones.

The qualitative composition of free amino acids in the experimental and control cheeses is also different. As part of experienced cheeses, both fat-free and with megajoule. fat in dry matter 20% is dominated by glutamic acid, glycine, alanine, valine and tyrosine. This difference in the composition of free amino acids of the experimental and control variants of cheeses is explained as follows: milk whey fermented with pure cultures of lactic acid bacteria and used as a coagulant contains significantly more free amino acids, which is associated with a deeper hydrolysis of milk proteins under the action of lactic acid bacteria enzymes, as well as lactic acid; experimental versions of cheeses were obtained with the addition of 17.5-18.5% milk whey and were distinguished by a markedly increased mass fraction of moisture and milk whey.

It is known that the taste and smell of cheeses is influenced by the content of such amino acids as glycine, alanine, proline, threonine and serine, which have a sweet taste. These amino acids are found both in total and in free amino acids. Perhaps they have a positive effect on the formation of the spicy taste of cheeses. The biological value of the proteins of the studied cheeses was determined by the amino acid scor method, based on the comparison of the results of determining the amino acid composition of the product proteins with the corresponding amino acid composition of the "ideal" protein. Currently, most researchers use a hypothetical (theoretical) protein recommended by FAO and WHO in 1973 as an "ideal" protein. 1 g of such a protein contains the following amount of essential amino acids (in mg): isoleucine - 40, leucine - 70, methionine + cystine -35, lysine - 55, phenylalanine + tyrosine - 60, threonine - 40, tryptophan - 10, valine - 50.

The results of calculations of the amino acid rate of the experimental and control fat-free ism.dzh. in dry matter, 20% of cheeses are given in table. 1, 2. Evaluating the quality of cheese proteins by the amino acid scoring method, it can be noted that they are distinguished by a good balance. So the optimal content of one of the essential amino acids - leucine in the "ideal" protein should be 70 mg per 1 g, while in the proteins of the experimental and control fat-free and with megajoule. in dry matter of 20% of cheeses, this figure was 98.8, 97.4, 103.7, 107.0 mg. As can be seen from the results of calculating the amino acid scor, experimental cheeses (both fat-free and fatty) are not inferior to control cheeses in terms of the balance of essential amino acids and have a high biological value. The limiting amino acids are methionine and cysteine, the rate of which for the studied cheeses was 34.7-50.3%.

Table 1.

Essential amino acids	Mass fraction, g per 100 g			Chemical speed	
	A	Б	B	C	Д
Isoleucine	4,0	4,27	4,15	106,6	103,6
Leucine	7,0	9,88	9,74	141,2	139,2
Methionine + Cysteine	3,5	1,65	1,76	47,2	50.3
Lysine	5,5	6,63	6,39	120,5 ,	176,2
+ Phenylalanine tyrosine	6,0	7,60	5,60	126,6	93,4
Threonine	4,0	3,90	3,90	100,0	100,0
Valine	5,0	5,25	4,84	105,1	100,0

A - "ideal" protein; B- low-fat soft cheese (experience); B - low fat soft cheese (control); C - fat-free soft cheese (experience); D - fat-free soft cheese (control);

Table 2.

Essential amino acids	Mass fraction, g per 100 g			Chemical score	
	A	Б	B	C	Д
Isoleucine	4,0	4,57	4,45	114,3	111,2

Leucine	7,0	10,37	10,6	148,2	152,8
Methionine Cysteine	3,5	1,66	1,21	47,5	34,7
Lysine	5,5	6,86	7,05	124,7	128,1
Phenylalanine tyrosine +	6,0	6,59	6,52	109,8	108,7
Threonine	4,0	4,15	4,17	103,9	104,3
Valine	5,0	5,43	5,00	108,7	100,0

CONCLUSION.

Thus, all studied samples of soft cheeses are rich in both quantitative and qualitative composition of amino acids. The proteins of all types of cheeses contain 17 amino acids. The lower, in comparison with the control, the content of both individual amino acids and their total amount in the experimental cheeses is apparently due to the fact that the experimental versions of cheeses have an increased mass fraction of moisture.

All essential amino acids were found in the proteins of the studied samples of soft cheeses, the total amount of which in the proteins of the studied cheeses is 36.38 - 39.63% and their amount is practically the same in the experimental and control cheeses.

The results of studies of the composition and content of free amino acids also established a relative increase in free amino acids in the experimental fat-free and with megajoule. in dry matter 20% soft cheeses compared to the control, which are respectively 128.3 and 135.5%. The different qualitative composition of free amino acids of the experimental and control cheeses was also established. So, in the composition of experienced cheeses, both fat-free and with megajoule. fat in dry matter 20% is dominated by glutamic acid, glycine, alanine, valine and tyrosine.

The results of the calculations of the amino acid speed established a good balance of the experimental cheeses (both low-fat and fatty) with essential amino acids and their high biological value.

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