

## COMPOSITION OF THE FREE AMINO ACIDS OF CAMELS' MILK AND SHUBAT

G. I. Sulaimanova, O. Kh. Saitmuratova, and L. G. Konstantinova

UDC 613.287.6:636.295

The chemical and protein compositions of camels' milk and shubat [fermented camels' milk] in Kazakhstan have been determined [1] but the chemical nature of camels' milk from the Aral region has not been studied. We have investigated the levels of free nonessential and essential amino acids in native camels' milk of the Nukusskii and Chimbaiskii regions of Karakalpakstan and also in the product of its fermentation — shubat (Table 1).

As can be seen from Table 1, the amounts of free amino acids in native camels' milk and in shubat at various stages of its maturation are different. In the milk taken in the Chimbaiskii region, 17 amino acids were detected, while 18 were found in that from the Nukusskii region. In the milk from both regions there was no tryptophan among the essential amino acids, and, moreover, in the milk from the Chimbaiskii region there was no histidine. In other respects, the camels' milks from the two regions scarcely differed.

During the fermentation process, in the three-day shubat the amount of essential amino acids (valine, leucine, isoleucine, phenylalanine, alanine) had increased, as compared with the milk, and tryptophan and asparagine, absent from the milk, were also found. In the shubat from the camels' milk of the Nukusskii region there were sharp increases in the amounts of such amino acids as glutamine, alanine, proline, tyrosine, methionine, leucine, phenylalanine, and lysine.

In the ten-day shubat, as compared with the initial camels' milk, the levels of aspartic and glutamic acids, and threonine, serine, glycine, tyrosine, valine, methionine, cysteine, leucine, isoleucine, and lysine had increased by a factor of 2 and more. At the same time, in the three-day shubat the levels of such amino acids as glutamine, asparagine, histidine, and phenylalanine had diminished. During the maturation of the shubat, the levels of essential amino acids almost doubled.

Characteristic for all lactic acid products, including shubat, is an appreciable increase in the amount of aspartic and glutamic acids, and glycine, serine, threonine, tyrosine, valine, phenylalanine, and isoleucine. As is known, shubat is a product of mixed fermentation — lactic and alcoholic. Lactic acid bacteria and yeasts predominate in the microflora of such beverages. During the fermentation of shubat the process intensifies, particularly the transaminase and dehydrogenase activities, and such essential amino acids as asparagine and tryptophan are synthesized. The increase in the content of free amino acids in the shubat fermentation process is apparently explained by the fact that under the influence of proteolytic enzymes — the agents of lactic acid and alcoholic fermentations — part of the proteins of the initial milk is split to form peptones and free amino acids. Together with these hydrolytic processes, a resynthesis of proteins by the agents of the lactic acid and alcoholic fermentations takes place, as is shown by the change in the amount of free amino acids in the shubat.

Thus, camels' milk is rich in free amino acids. The three- and ten-day shubats contained a large amount of the essential amino acids valine, tyrosine, leucine, and phenylalanine. In the three- and ten-day shubats the amounts of such essential amino acids as leucine and methionine had increased. These amino acids have not been found in either liquid or solid koumiss.

Asparagine, tryptophan, and histidine were absent from the amino acids of the milk taken in the Chimbaiskii region, but only asparagine and tryptophan in the milk of the Nukusskii region. Asparagine, histidine, and tryptophan appeared in the shubat, although they were not present in the native milk. Furthermore, during the fermentation of the shubats the amount of amino acids, particularly the nonessential ones aspartic and glutamic acids and alanine, proline, and histidine and the essential ones (tyrosine, valine, cysteine, and phenylalanine), increased by factors of 2-3 and more.

---

Institute of Bioecology, KKO, Academy of Sciences of the Republic of Uzbekistan. A. S. Sadykov Institute of Bioorganic Chemistry, Academy of Sciences of the Republic of Uzbekistan, Tashkent. Translated from *Khimiya Prirodnykh Soedinenii*, No. 2, pp. 247-249, March-April, 1998. Original article submitted September 9, 1997.

TABLE 1. Levels of Free Amino Acids in the Camels' Milk and Shubat of the Aral Region (amounts of amino acids, mg-%)

Amino acid	Native milk		Shubat			
	Chim-bai	Nu-kus	3-day		10-day	
			Chim-bai	Nu-kus	Chim-bai	Nu-kus
Aspartic acid	6.7	7.2	8.9	7.8	1.34	11.2
Glutamic acid	8.2	9.6	12.7	11.4	17.2	21.0
Glutamine	0.6	0.8	6.0	8.4	4.1	3.9
Asparagine	–	–	4.1	4.2	3.1	2.2
Serine	0.9	1.0	1.6	2.3	4.6	5.1
Glycine	1.2	1.1	1.7	2.1	5.4	5.9
Threonine	0.9	1.1	1.1	0.9	3.2	2.8
Alanine	1.8	1.9	4.5	5.0	8.3	9.9
Proline	1.2	1.2	3.2	2.3	5.0	4.7
Histidine	–	0.2	5.6	6.3	3.9	4.1
Arginine	1.1	1.2	2.0	2.0	3.1	4.0
Tyrosine + valine	0.8	0.9	5.1	4.8	6.9	7.7
Methionine	0.6	0.4	2.4	1.8	3.9	4.4
Cysteine	0.8	0.5	1.4	1.6	10.1	8.8
Leucine	0.8	0.8	2.8	3.2	6.5	7.5
Isoleucine	2.1	2.2	2.9	3.4	7.3	8.3
Phenylalanine	1.1	1.2	7.8	8.2	7.0	8.0
Tryptophan	–	–	3.7	2.4	1.9	3.2
Lysine	1.0	1.2	2.5	2.9	8.1	4.0
	29.8	32.5	80.0	81.0	123.0	126.8

We may note that the increase in the amount of the free essential amino acids leucine and methionine in the three- and ten-day shubats possibly improves the nutritional and dietetic value of the product.

## REFERENCES

1. Kh. Shigaeva and M. Sh. Ospanova, The Microflora of the National Lactic Acid Beverages [in Russian], Nauka, Alma-Ata (1983).
2. Sh. M. Musaev and D. K. Ogai, The Biology of Thermophilic Lactic Acid Bacteria and their Experimental Selection [in Russian], Tashkent (1978), p. 5.
3. I. Mayhaw, T. Chromatogr., 10, No. 1 (1989) [sic].