

## CARBOHYDRATES FROM CAMEL'S MILK AND SHUBAT NEAR THE ARAL SEA

O. Kh. Saitmuratova<sup>1</sup> and G. I. Sulaimanova<sup>2</sup>

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*Camel's milk and shubat are demonstrated experimentally to differ quantitatively in carbohydrate content. Shubat is recommended as a food source for Fe-deficient anemics and diabetics because of its low content of carbohydrates and high content of Fe and Zn.*

**Key words:** shubat, anemia, diabetes.

Previously we determined the composition of free amino acids and microelements in camel's milk and shubat near the Aral Sea [1, 2]. However, the monosaccharide composition of camel's milk was not investigated.

The content of milk sugars in mammal milk, including camel's, has been reported [3-6]. According to the literature [5], milk contains free lactose and glucose in small quantities. The presence of seven oligosaccharides, three of which consist of galactose and mannose, was established by chromatography [4].

The present article contains results from an investigation of the quantitative and qualitative carbohydrate composition of camel's milk and its fermented product, shubat, that were collected from several regions of Karakalpakstan.

The quantitative content of carbohydrates in camel's milk and shubat samples from four regions of Karakalpakstan Republic was determined by the literature method [7]. The carbohydrate content in all samples of camel's milk was almost the same (16.0-16.5%). It should be noted that the carbohydrate content exceeds by three and more times that of camel's milk from various regions of Kazakhstan. However, the carbohydrate content in shubat decreases sharply, by almost 3-5 times. For example, samples of 3-day camel shubat collected in Takhtakupyrskii, Khodzheiliiskii, Nukusskii, and Chimbaiskii regions contain 5.0, 3.8, 3.7, and 2.5% carbohydrates, respectively; 10-day, 4.8, 3.2, 2.5, and 3.0%, respectively. This indicates that the milk fermentation process cleaves and decomposes carbohydrates.

Then, the monosaccharide composition of the biopreparation was determined by performing total acid hydrolysis and analysis by PC and GLC of the aldonitrile acetates. All milk and shubat samples contained glucose, galactose, and insignificant amounts of mannose. The results are presented below (%):

	Sample	Glc	Gal	Man
1.	Camel's milk, Khodzheiliiskii region	78.3	19.06	2.61
2.	Camel shubat, Khodzheiliiskii region	50.0	33.3	16.6
3.	Camel shubat, Takhtakupyrskii region	58.9	23.2	16.6

It can be seen that camel's milk and shubat contain glucose, galactose, and mannose. The tendency to contain monosaccharides persists in camel's milk from another region. The monosaccharide content in shubat, especially mannose, decreases.

It should be noted that the low content of carbohydrates and relatively high amounts of Fe and Zn, which have been observed by us previously [2], enable shubat to be recommended as a food preparation for treating Fe-deficiency anemia and diabetes.

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1) A. S. Sadykov Institute of Bioorganic Chemistry, Academy of Sciences of the Republic of Uzbekistan, Tashkent, fax (99871) 162 70 71; 2) Institute of Bioecology, KKO, Academy of Sciences of the Republic of Uzbekistan, Nukus. Translated from *Khimiya Prirodnykh Soedinenii*, No. 3, pp. 212-213, May-June, 2000. Original article submitted June 12, 2000.

## EXPERIMENTAL

Lyophilized and dried camel's milk and shubat from four regions of the Karakalpakstan Republic were used.

**Total carbohydrate content** was determined by the phenol—sulfuric acid method [7]. Phenol (0.5 ml, 5%) and the studied sample (0.1 ml, mg/g) were hydrolyzed for 10 min at room temperature with H<sub>2</sub>SO<sub>4</sub> (2.5 ml, conc.) (sample for Saaval); detection at 490 nm. A calibration curve was constructed for glucose.

**Descending paper chromatography** of sugars was performed in 1-butanol—pyridine—water (6:4:3) on FN-1,13 paper (Germany) with development by acid aniline phthalate.

**Monosaccharide composition of camel's milk and shubat** was determined by hydrolysis using H<sub>2</sub>SO<sub>4</sub> (2 N) for 8 h at 100 °C. The hydrolysate was neutralized by BaCO<sub>3</sub>, passed over KU-2 (H<sup>+</sup>) cation-exchanger, and evaporated in a rotary evaporator. GLC was performed on a Tsvet-101 chromatograph with a flame-ionization detector under the following conditions: stainless-steel column (200×0.01 mm), 5% Silicone XE-60 on chromaton NAW-DMCS (0.200-0.250 mm), 210 °C, carrier gas He, flow rate 60 ml/min for aldonitrile acetates [8].

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