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# EVALUATION OF CHEMICAL AND NUTRITIONAL VALUE OF CAMEL MEAT ORIGINATING FROM ALMATY REGION

**Aruzhan Shoman<sup>1,2</sup>, Urishbay Chomanov<sup>1,2</sup>, Assiya Serikbayeva<sup>1</sup>, Laura Mamayeva<sup>1</sup>, Tamara Tultabayeva<sup>1,2</sup>, Gulmira Kenenbay<sup>2</sup>**

<sup>1</sup>«Kazakh National Agrarian University» Almaty, Kazakhstan.

<sup>2</sup>«Kazakh research institute of processing and food industry» Almaty, Kazakhstan

**Abstract**-- The chemical, amino acid and fatty acid compositions in the muscle tissue of camel meat of Almaty region were studied. The data obtained are important indicators that can be used to qualitatively and quantitatively assess the functionality of camel meat. Camel meat has a high nutritional value, the protein content is within 18.73-19.52%, moisture 76.59-78.5%, fat 2.1-2.77%. The material to determine the fatty acid composition of camel meat, we have selected from muscle tissue of the thigh (Biceps femoris) 3-year-old camel (dromedary). It was found that the fat content in camel meat is 2.55%, including saturated fatty acids 64.53% and monounsaturated 34.34% g/100 g of lipids. The ratio of unsaturated to saturated fatty acids averages 1.9%. Camel fat is characterized by a high content of monounsaturated fatty acids, such as oleic and palmitoleic (29.77% and 3.32% g/100 g of lipids). High lysine content of 10.47% and low tryptophan content of 0.16% were noted in comparison with the results of other authors. The ratio of the amount of essential amino acids to interchangeable in camel meat in the test sample is 0.70%, and the highest rate in Arabic meat is 0.97%.

Key words: camel meat, fatty acid, amino acid, nutritional value, red meat.

## 1. Introduction

In recent years, camel breeding has been intensively developing in Kazakhstan, especially widespread in the South-West of the country (Mangyshlak, Atyrau, West Kazakhstan, Aktobe, Kyzylorda and Turkestan regions), where the climate is most optimal for camel breeding, as camel breeding has a dairy and meat direction. Camel meat is consumed by the local population at the level of beef and lamb [1].

Camel breeding in Kazakhstan occupies a leading position among other branches of agricultural production, providing the population with valuable food, milk and dietary meat, and the population — important raw materials (wool, skin, etc.) [2]. The rate of development of camel breeding in our country in recent years shows the development of the livestock industry. Camel meat has become in great demand among the local population in the Western and Southern regions, where camel farms predominate and account for a large share of consumption. In this regard, the most economically justified further increase in the production of camel meat [3].

Studies of the physical and chemical composition of camel meat, a number of domestic and foreign scientists, showed that camel contains all the necessary substances for human nutrition, it is a source of basic nutrients (proteins, animal fats), which are represented in it in the most optimal quantitative ratio and are easily absorbed by the human body [4]. At the same time, the greatest value for consumers of camel meat are proteins consisting of interchangeable and essential amino acids [2].

Camel meat has high nutritional value, protein content is 18.73-19.52%, moisture 76.59-78.5%, fat 2.1-2.77%. [5]. The protein has a high content of Proline than other types of meat, this is due to the large amount of connective tissue and a lower content of tryptophan, aspartic acid and tyrosine. Camel meat is a source of many vitamins and minerals: especially group B, iron, calcium and phosphorus, and most importantly is characterized by low cholesterol [6].

The amount of various essential and non-essential amino acids in proteins of any kind of meat determines its nutritional value and biological value [7]. The high biological significance of essential amino acids is that they are involved in the synthesis of tissue cells and perform a number of special functions in the human body. The most important of them are lysine, leucine, isoleucine, valine, tryptophan, etc. [8].



Fatty acid composition of food products is an important qualitative indicator, which can be used to qualitatively and quantitatively assess their functionality[8].

In Saudi Arabia, the fatty acid composition of camel meat of young males of one-humped camels was studied [9]. Saturated fatty acids make up 51.5% of the total fatty acids, and mono-and polyunsaturated ones make up 29.9% and 18.6% respectively. The main fatty acids of camel are palmitic (34,4%), oleic (28,2%), myristic (10,3%) and stearic (10,0%) fatty acids [9,10].

**Objects and methods of research.** The objects of the study were thigh muscle tissue (Biceps femoris) from the carcass of a 3-year-old single-humped camel. The biochemical composition of the samples was studied in the analytical research laboratory of the University Putra of Malaysia. The mass fraction of moisture was determined in the laboratory of the Kazakh-Japanese KazNAU center, by drying the sample according to GOST 9793-74. The mass fraction of protein – photometric method of Kyedal according to GOST 25011-81. The mass fraction of fat – using the extraction apparatus sokseta 23042-2015. fatty acid composition – by gas-liquid chromatography according to GOST R 55483-2013. Mass fraction of ash – method of ashing (combustion) of samples according to GOST R 53642-2009. Amino acid composition was determined on the automatic amino acid analyzer Hitachi according to the instructions for this instrument.

Results and discussions.

**Table 1 - Chemical composition of camel meat**

Authorofresearch	Content, %			
	Moisture	Fat	Protein	Ash
A.Shoman (2018)	77,62	2,55	18,73	1,10
A.Tayeva(2017)	76,59	2,77	19,52	1,13
I. Kadim (2011)	78,5	2,50	18,00	1,00
G. Raiymbek (2013)	78,5	2,1	18,3	1,0

Analyzing the obtained data, it can be concluded that the moisture content in the camel meat of the Kazakh dromedar is less than in the Arab camel meat, and fat and protein are more. This is due to the feeding of camels and climatic conditions of Kazakhstan. Along with the study of the chemical composition of camel meat, we have conducted studies of fatty acid composition of camel meat (Table. 2 and Fig.1).

**Table 2 - fatty Acid composition of camel meat,%**

Fattyacidcode	Classification	Content,%			
		G. Raiymbek(2013)	I. Kadim(2013)	A.Tayeva(2017)	A.Shoman(2018)
<i>Saturated fatty acid</i>					
	Total:	48,96	55,65	50,42	64,53
C8:0	Caprylic	-	-	-	0,07
C10:0	Capric	-	-	0,11	0,11
C12:0	Lauric	1,44	1,44	0,53	0,37
C13:0	Tridecane	1,21	1,21	-	0,08
C14:0	Myristic	7,83	3,10	8,75	7,19
C15:0	Pentadecane	2,12	2,10	0,74	1,25
C16:0	Palmitic	26,16	28,50	24,37	28,18
C17:0	Margarine	2,15	-	-	1,16
C18:0	Stearic	8,02	19,30	15,92	25,62
C20:0	Arachidic	0,03	-	-	0,50
<i>Monounsaturated fatty acid</i>					
	Total:	38,02	41,4	42,09	34,34
C14:1	Myristoleic, $\omega 5$	1,62	1,60	0,49	0,41
C15:1	Pentadecanoic	1,02	-	0,28	0,12

C16:1	Palmitoleic, $\omega$ 7	8,57	6,30	1,64	3,32
C17:1	Hepatectomy	0,11	-	0,61	0,72
C18:1	Oleic, $\omega$ 9	26,88	33,50	39,07	29,77
<i>Polyunsaturated fatty acid</i>					
	Total:	12,82	5,6	5,86	1,54
C18:2	Linoleic, $\omega$ 6	7,94	3,20	3,61	1,24
C18:3	Linolenic, $\omega$ 3	0,54	1,20	1,75	-
C20:1	Eicosene	-	-	-	0,30
C20:2	Eicosadienoic	0,42	-	-	-
C20:3	Eicosatrienoic, $\omega$ 6	0,41	-	-	-
C20:4	Arachidonic, $\omega$ 6	3,51	1,20	0,5	-

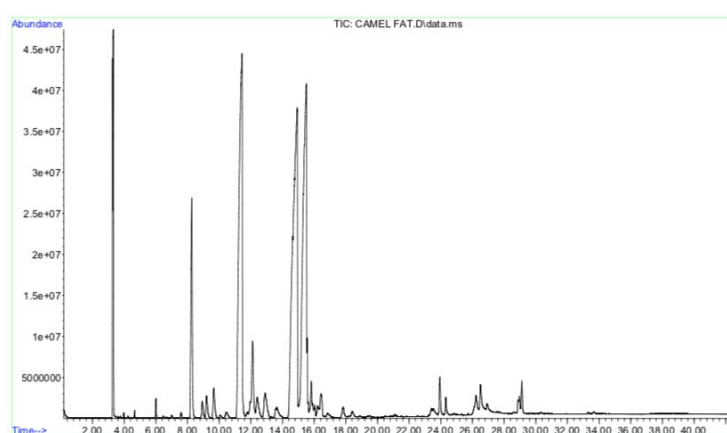


Figure.1 Chromatogram of fatty acid composition of camel meat.

Table 2 presents comparative data on the study of fatty acids of camel meat by different authors: Raiymbek G. and others (Kazakhstan, Sultanate of Oman), Tayeva A. and others (Kazakhstan), Kadim I. and others (Sultanate of Oman, Saudi Arabia) and our data. The table shows that the total content of fatty acids of camel meat differs from one author to another. However, there are small differences in the amount of saturated fatty acids (48.96%; 50.42%; 55.65% and 64.53%), the least amount of saturated fatty acids is observed in studies conducted in Saudi Arabia by the author Raiymbek G. (48.96%), and the largest number of polyunsaturated fatty acids (12.82%), and in our test sample (1.54%). And the content of monounsaturated fatty acids differ slightly. This is due to the fact that a sample of camel meat was selected from the muscle tissue of a young camel.

In the study of the amino acid composition of the muscle tissue of camel meat, we determined the content of 19 amino acids, 8 of which are essential. These data are presented in table 3 and figure 2.

Table 3 - Amino acid composition of white meat, mg/100g

Amino acid name	Content, %			
	G. Raiymbek (2013)	I. Kadim (2013).	A.Tayeva (2017).	A.Shoman (2018).
<i>Essential amino acids</i>	39,7	44,96	39,67	40,5
Valine	5,6	6,10	5,02	6,0
Isoleucine	4,7	6,43	4,71	4,26
Leucine	8,3	6,46	8,66	8,1
Lysine	9,4	5,35	7,68	10,47
Methionine	2,9	7,21	3,33	2,84
Threonine	4,5	7,03	4,92	4,17

Tryptophan	-	0,44	0,43	0,16
Phenylalanine	4,3	5,94	4,92	4,05
<i>Nonessential amino acid</i>	53,6	46,48	59,01	58,86
Alanine	6,5	3,83	5,53	4,78
Arginine	6,6	5,55	7,63	8,92
Aspartic acid	9,3	10,07	9,22	9,06
Histidine	15,9	6,84	4,0	3,93
Glycine	4,3	-	4,71	5,76
Glutamic acid	-	-	17,11	15,29
Oxyproline	-	-	0,46	0,49
Proline	3,9	7,42	2,46	3,03
Serine	3,6	4,27	4,1	4,26
Tyrosine	3,5	7,32	3,79	3,34
Cystine	-	-	-	-
Ratio of Essential and Nonessential amino acids	0,74	0,97	0,67	0,70

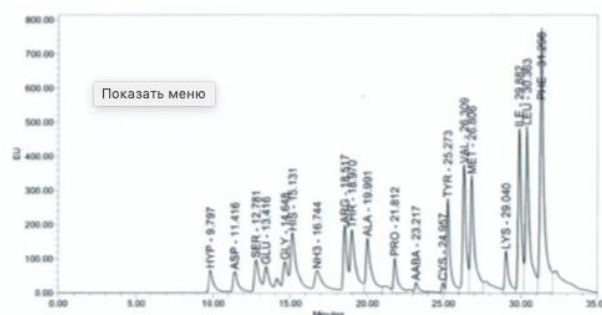


Figure.2 Aminogram of camel meat protein.

In the total content of essential amino acids, there is a slight difference from the results of other authors, who studied the amino acid composition of camel meat of Kazakhstan origin, except camel meat of Arab origin, which confirms the correctness of the data. It should be noted high lysine content of 10.47% and low tryptophan content of 0.16% compared with the results of other authors.

One of the important factors determining the property of connective tissue is the relative content of elastin and collagen. Collagen is a defective protein, because it does not include one essential amino acid - tryptophan. Collagen accounts for up to 14% of the replaceable amino acid - oxyproline, which is not found in full-fledged meat proteins. Therefore, the content of full-fledged proteins can be determined by the amount of tryptophan, and defective - by the amount of oxyproline.

Table 3 shows that the content of the essential amino acid tryptophan in the camel meat of the two authors is 3 times higher than in our experimental sample. At the same time, the samples of foreign authors did not contain oxyproline. The fluctuations noted in the content of these amino acids are probably associated with individual characteristics of these animals.

We would like to note the high content of tyrosine 7.32% according to the results of the research in the samples of camel meat of the scientist from the Sultanate of Oman, Kadim I. in comparison with the results of domestic authors. The ratio of the amount of essential amino acids to interchangeable in camel meat in the test sample is 0.70%, and the highest rate in Arabic meat is 0.97%.

## 2. Conclusion

As a result of the research of the biological value of camel meat in Almaty region, we can say that the total content of fatty acids of camel meat differs from one author to another. However, there are small differences in the amount of saturated fatty acids (48.96; 50.42; 55.65 and 64.53%), the least amount of saturated fatty acids is observed in Arab meat (48.96%), as well as the largest number of polyunsaturated fatty acids (12.82%), in our experimental sample of polyunsaturated - 1.54%. And the content of monounsaturated fatty acids differ slightly.

It should be noted that in the camel meat of the two authors the content of the essential amino acid – tryptophan is 3 times higher than in our experimental sample, as well as in the samples of foreign authors (Kadim I. and Raiymbek G.) the content of oxyproline was not found.

The ratio of the amount of essential amino acids to interchangeable in camel meat in the test sample is 0.70%, and the highest rate in Arabic meat is 0.97%.

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