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TO STUDY THE CHEMICAL COMPOSITION OF WOOLEN FABRIC

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ABSTRACT
Wool is characterized by a higher content of macronutrients than silk, i.e. 10125 and 6648 mg/kg, respectively. In the wool sample, the largest amount among the elements belongs to phosphorus (3790 mg/kg), and the smallest to magnesium (670 mg/kg). 17 trace elements were found in the wool sample. Iron has the highest content among microelements (484 mg/kg).

Keywords: wool, ash content, nitrogen, total protein, macro- and microelements, inductively coupled plasma mass spectrometer.

INTRODUCTION

Wool fibers are mainly composed of proteins of the keratin group. Keratins differ from other proteins in their increased sulfur content - 3-5% [1-2]. The technological properties of wool are associated with sulfur to a certain extent. With an increase in the sulfur content in wool, its spinning properties improve, and the strength of wool fibers increases [3-4]. Wool keratin is represented by two of its varieties: keratin A and keratin C. Keratin A forms the substance of the scaly layer, and keratin C forms the cortical and core layers. Keratin C, unlike keratin A, contains the amino acid tyrosine [5-6].

Material and Method:

The amino acid composition of the wool sample was also studied, the results are presented in Table 1. It was found that the wool sample contains 17 amino acids [7-8]. Asparagine, glutamine and tryptophan are absent. The highest content in wool belongs to the amino acids glycine (26.71 mol %), phenylalanine (14.65 mol %), and alanine (8.67 mol %) [9-10] . The smallest amount of amino acids in wool belongs to proline (0.79 mol %) and lysine (1.09 mol %). Wool fiber contains the following essential amino acids: threonine, methionine, isoleucine, valine, phenylalanine, leucine and lysine. The total amount of essential amino acids in wool is 33.5 mol%. In the wool sample, the aromatic hydrophobic amino acid tryptophan containing the indole nucleus was not detected [11]. Wool proteins are also balanced in terms of non-essential amino acids. In the composition of wool, the amount of amino acids containing a hydroxyl group in its composition is 19.4 mol %. This is less than the number of amino acids containing a hydroxyl group in silk.

Table 1. Amino acid composition of wool proteins

№	Amino acids	Concentration, mol%
1	Aspartic acid	1.8
2	Glutamic acid	4.54
3	Serene	8.41
4	Glycine	26.71
5	Asparagine	0
6	Glutamine	0
7	Cysteine	3
8	Threonine*	3.43
9	Argenin	1.63
10	Alanine	8.67
11	Proline	0.79
12	Tyrosine	7.56
13	Valine*	3.54
14	Methionine*	2.65
15	Isoleucine*	1.98
16	Leucine*	6.16
17	Histidine	3.57
18	Tryptophan*	0
19	Phenylalanine*	14.65
20	Lysine HCl*	1.09

***-essential amino acids**

The presence of 26 macro and microelements was found in the wool sample. Table 2 presents data on the composition of macro and microelements in a wool sample [12]. Based on data analysis, it was found that wool fiber has the highest content of phosphorus, sodium, calcium, sulfur, potassium, magnesium and iron. The following macroelements were found in the wool sample: Na, Mg, P, S, K, Ca. The order of decreasing macronutrient content in wool is: P > Na > Ca > S > K > Mg [13].

Table 2. Mineral composition of wool, mg/kg

№ t/p	Elements	Content of elements, mg/kg
1(11)	Na	1830
2(12)	Mg	670
3(13)	Al	81
4(15)	P	3790
5(16)	S	1308
6(19)	K	1007
7(20)	Ca	1439
8(22)	Ti	17
9(23)	V	0.46
10(24)	Cr	20.9
11(25)	Mn	9.6
12(26)	Fe	484
13(27)	Co	0.38
14(28)	Ni	10.9
15(29)	Cu	32.7
16(30)	Zn	37.9
17(33)	As	2.6
18(34)	Se	43.2
19(42)	Mo	2.9
20(50)	Sn	379
21(51)	Sb	0.26
22(53)	I	6.5
23(56)	Ba	15.7
24(80)	Hg	0.929
25(82)	Pb	1.3
26(83)	Bi	2.3

* In brackets - the serial number of the element in the periodic table.

Gentlemen: Wool is characterized by a higher content of macronutrients than silk, i.e. 10125 and 6648 mg/kg, respectively. In the wool sample, the largest amount among the elements belongs to phosphorus (3790 mg/kg), and the smallest to magnesium (670 mg/kg). 17 trace elements were found in the wool sample. Iron has the highest content among microelements (484 mg/kg). Among trace elements, vanadium, cobalt and lead have the lowest amounts (Table 2). Mercury, lead and arsenic were found among the toxic elements. Their content is much lower than the recommended MPC for food products.

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