R. Ianchici, et al. Scientifical Researches. Agroalimentary Processes and Technologies, Volume XI, No. 2 (2005), 385-388

RESEARCHES REGARDING THE NUTRITIONAL QUALITY OF PROTEINS FROM THE MAIN SPECIES OF CULTIVATED MUSHROOMS

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Abstract

Cultivated mushrooms represent an important source of eatable proteins. These are easily assimilated by the body and contain all the essential amino acids, thus being complete proteins. Also the content in proteins is much higher than any other vegetable product, which makes mushrooms to be an important source of vegetable proteins. Taking into consideration the fact that mushrooms have little fats but lots of proteins and lots of proteins and eatable fibers, they are used to obtain a range of dietary products.

***Keywords**: mushrooms, proteins*

Introduction

Cultivated mushrooms have a high content of proteins reported to the dry content given the fact that water represents 88-92% of mushrooms weight. Thus, if the values found in table 1 (Glăman, 1997; Maier, 1963; Segal, 1983) are reported to the dry content then mushrooms have 35% proteins, milk has 27%, eggs have 50% and meet in the same conditions has 56% proteins.

Table 1. Chemical composition of raw mushrooms compared with other foods

	Water %	Proteins %	Lipids %	Sugars %	Ash %
Mushrooms	90	3.5	0.3	4.0	1.0
Potatoes	75	1.8	0.1	21.0	1.1
Milk	87	3.5	3.7	4.8	0.7
Meat	68	18.0	13.0	0.5	0.5
Eggs	72	14.0	12.0	0.6	1.4

Source: Glăman (1997); Segal (1983)

Proteins from mushrooms have all the essential amino acids. In table 2 is given the composition in essential amino acids of the main cultivated species of mushrooms. (Glăman 1997).

Table. 2 Content in essential amino acids of several cultivated mushrooms, expressed in mg/g nitrogen

Amino acid	Agaricus bisporus	Pleurotus ostreatus	Lentinus edodes	Volvariella volvacea
Isoleucine	200-366	266-267	218	193-261
Leucine	329-580	390-610	348	248-346
Lysine	357-527	250-287	174	427-650
Methionine	41-126	90-97	87	78-94
Phenylalanine	186-340	216-233	261	159-285
Threonine	243-366	264-290	261	209-307
Tryptophan	91-113	61-87	162	86-112
Valine	112-420	309-326	261	298-414

Source: Glăman (1997)

Experimental

The nutritional qualities of proteins depend on many factors, the most important being the content in essential amino acids and the proportion between them (Dabbour, 2002; Matilla, 2004). From this point of view the evaluation of the nutritional properties of proteins in general can be performed by comparison with the etalon protein.

Table 3. Proportion of the essential amino acids from the etalon protein FAO/OMS

Essential amino acid	Proportion	
	mg/g protein	mg/g nitrogen
Isoleucine	40	250
Leucine	70	440
Lysine	55	340
Methionine + cysteine	35	220
Phenylalanine + tyrosine	60	380
Threonine	40	250
Tryptophan	10	60
Valine	50	310

Source: Segal (1983)

The chemical scores for each essential amino acid can be calculated with the help of the following relation:

$$Ic = \frac{AAPT}{AAPE} \cdot 100$$

where: AAPT – content in the amino acid from the tested protein, mg/g nitrogen

AAPE – content in the amino acid from the etalon protein, mg/g nitrogen

Thus in the etalon protein all amino acids have the chemical scores 100. A protein found in foods is of superior quality if all chemical indices for the proteins are higher than 50.

After calculating the chemical scores for each of the 8 essential amino acids the OSER index (EAA – index) that represent the geometrical average of the chemical scores. The calculus relation is:

$$EAAindex = \sqrt[8]{Ic_1 \cdot Ic_2 \cdot Ic_3 \cdot ..... \cdot Ic_8}$$

where: $Ic_1 ... Ic_8$ - chemical scores of the 8 essential amino acids

Taking into consideration the average content in essential amino acids of the mushrooms species from table 2, the chemical scores as well as the OSER index can be calculated (USDA, 1986).

Results and Discussions

The values were obtained by table calculations using the Excel package and are presented in table 4.

Table 4. The value of the chemical indices for the essential amino acids and the OSSER index for the main species of cultivated mushrooms

Amino acid	Chemical indices of the essential amino acids			
	Agaricus bisporus	Pleurotus ostreatus	Lentinus edodes	Volvariella volvacea
Isoleucine	113	106	87	90
Leucine	103	113	79	67
Lysine	130	78	51	158
Methionine	37	42	39	39
Phenylalanine	69	59	68	58
Threonine	121	110	104	103
Tryptophan	170	123	270	165
Valine	85	102	84	114
OSER index	95.79	87.26	83.10	90.07

As it can be seen from table 4 proteins from mushrooms are poor in sulphur amino acids (methionine and cysteine), being similar to vegetables from this point of view. Thus methionine represents a limitation factor for the mushroom proteins, putting them in the second quality class where are found the majority of vegetable proteins.

Conclusions

Mushrooms are a rich source of vegetal proteins that are easily assimilated by the organism and having the majority of the essential amino acids and in quantities close to those of the etalon protein. In spite of this mushroom proteins are poor in sulphur amino acids (methionine and cysteine), which represent a limitation factor and thus making them similar to vegetables. Thus the proteins of mushrooms can be put in the second class of proteins, with medium biological value.

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