Bulletin UASVM Agriculture, 68(2)/2011
Print ISSN 1843-5246; Electronic ISSN 1843-5386

Sunflower Halva with Addition of Hemp Protein Powder I. Determination of Protein Content

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Abstract. The aim of the paper was to obtain a new confectionery product, with added hemp protein powder, the protein content of the final product being determined. Hemp protein powder was added in order to improve oil quality, fatty acid profile (ω-3, ω-6 addition) and to increase the protein content. Protein content is not a current determination in the manufacturing process of traditional halva; in this paper the protein content of traditional sunflower halva and of the one improved with hemp protein powder was determined by Kjeldahl method. The determination allowed a better understanding regarding protein content of both types of halva.

Keywords: sunflower halva, hemp flour, protein content.

INTRODUCTION

Halva is a confectionery product obtained from roasted and milled oleaginous seeds called *tahini*, which is mixed with cooked sugar obtained from a mixture of sugar and glucose syrup beated with *Saponaria officinalis* (soapwort) root extract (Racol□a, 2008).

Sunflower halva popular in countries from Eastern Europe is made of sunflower seeds tahini. Sunflower seeds are rich in lipids (46 – 55%), proteins (23 – 24%), carbohydrates (8 – 12%); water content is 4 – 10%, and ash 3 – 4% (Muste, 2008). Halva is composed of 500 – 600 g/kg tahini, 200 – 250 g/ kg sugar, 200 – 250 g/ kg glucose and 10 g/ kg additives such as whipping agents (Eissa and Zohair, 2006). It is one of the most nutritional food products having an energy content of 510 – 550 Kcal/100 g. Oil separation in halva is a major problem that affects quality upon storage (Ereifej *et al*., 2005); hemp protein powder was added in order to reduce oil separation. In the mean time the hemp flour addition bring an improvement of the newly created product nutritive value. Even if, protein content is not a current determination in the manufacturing process of traditional halva, in this paper the protein content of traditional sunflower halva and of the one improved with hemp flour was determined by Kjeldahl method.

MATERIALS AND METHODS

Samples. Halva samples were manufactured by traditional technology from sunflower seeds. Hemp protein powder chemical composition is presented in Table 1. Energy value of hemp protein powder is 447 Kcal / 1870KJ / 100g.

Hemp protein powder contains all essentially amino acids. In hemp seeds are edible protein which can be used in full extent by the human body. 65% of the total protein in hemp seed is globular protein called edestine, which greatly resembles with the globulin from human blood plasma. Edestine is easily digested and vital to maintain a healthy immune

system. Edestine has the unique ability to stimulate production of antibodies against invasive agents and is almost devoid of phosphorus, an important fact in renal disorders.

Tab. 1

Chemical composition of hemp protein powder

Component		**Maximum level**
Protein	%	50
Fats	%	12
Saturated	%	1.2
Polyunsaturated		
Omega 3	%	2.4
Omega 6	%	6.6
Monounsaturated		
Omega 9	%	1.8
Carbohydrates	%	26
Fibre	%	21
Sugar	%	5
Cholesterol	%	0
Minerals		
Calcium	mg	81
Iron	mg	9
Phosphorous	mg	2 110
Sodium	mg	21
Vitamin E	mg	0.8
Microbiology test		
Yeasts	UFC/g	1

Hemp protein contains all the 21 known amino acids including the 8 essential amino acids that adult human body cannot produce. Proteins are potential allergens common reactions reported for soy, dairy products, eggs or peanut proteins. Instead, hemp seed allergies have never been reported. Hemp seeds contain less oligosaccharide present for example in peas and beans that produce intestinal gas.

Fibers of the hemp seed are ideal to detoxify the colon. Fibers from hemp seeds are 92% insoluble and maintain healthy intestinal flora, can eliminate constipation and cleanse the intestinal tract.

Analytical method. Kjeldahl method was used to determine the protein content of both types of halva. The method consists in determination of total nitrogen which, multiplied by the coefficient of transformation of nitrogen in protein, gives the amount of protein in the sample. For vegetable materials the coefficient of transformation of nitrogen is 5.7.

Apparatus and reagents. Digestion and distillation unit, 500 ml Kjeldahl flask, sulphuric acid d = 1.832 and n/10, sodium hydroxide solution n/10, copper sulphate 33%, potassium sulphate, methyl red solution alc. 0.02%.

Digestion. In a Kjeldahl flask of 250-500 ml, which serves to digestion, 0.5-1g of sample are introduced, finely ground and homogenised in advance. Add 0.5-1g copper sulphate, 5-10g of potassium sulphate and 20 ml sulphuric acid d = 1.832. At the end of digestion the sample is clear, bluish-green, without a brown shade.

Distillation. In the distillation flask 80-90 ml of 33-35% sodium hydroxide are added. At the lower end of condenser the distillate is caught in an Erlenmeyer flask where are 20 to 30

ml n/10 sulphuric acid and 2-3 drops of methyl red. Distillation end is recognized by checking the reaction which is alkali at the beginning and becomes acidic.

Titration. Excess sulphuric acid is titrated with n/10 sodium hydroxide. The percentage of protein is calculated as:

$$\text{Protein}\% = \frac{(V - V_1) \times 0{,}0014 \times 100}{g} \times 5{,}7$$

Where:
V – volume of n/10 sulfuric acid from the Erlenmeyer flask [ml];
V1 - volume of n/10 sodium hydroxide used in titration of excess acid [ml];
g – sample weight taken for analysis [g];
5.7 - nitrogen in the protein is 17.5% (100:17,5 = 5.7);
0.0014 - the amount of nitrogen in [g] corresponding to 1 ml of sulfuric acid sol. 0.1 n.

RESULTS AND DISCUSSION

The experiment was done having as control sample the standard Halva Feleacul obtained by kneading a batch of 28 kg tahini and 17 kg cooked sugar. At the kneading step 300g, respectively 380g of hemp protein powder was added in order to obtain the two prototypes of halva with hemp protein powder. Analyses were performed on samples shown in Table 2 with the protein content resulted in the three cases.

Tab. 2.

Summary of analysis

Sample trial	**Protein content [%]**
P_1- halva+hemp protein powder 300g	12.19
P_2-halva+ hemp protein powder 380g	12.58
P_3- traditional halva	11.60

CONCLUSIONS

There are used 28kg sunflower tahini, 17kg cooked sugar and 300g, respectively 380g hemp protein powder. The percent of hemp protein powder is calculated as follow:

45,300kg.....100%
0,3kg.....X

X=0,66%

45,380kg.....100%
0,38kg.....Y

Y=0,84%

For the addition of 0.66% of hemp protein powder in the finished product, the protein content is 12.19%. For the control sample, where no hemp protein powder was added protein content is 11.60%.

If the addition of hemp protein powder is 0.84% in the finished product, the protein content increases to 12.58%.

So an increase in the quantity of hemp protein powder of about 27% $(\frac{0,84}{0,66}100 =\approx 127)$, the protein content of the finished product increases by 3%. $(\frac{12,58}{12,19}\times 100 =\approx 103)$

It is recommended an increase of the amount of hemp protein powder added to notice the sensory changes, not only chemical changes. The increase of the amount of hemp protein powder will improve the finished product quality regarding its fatty acid profile (ω-3, ω-6 addition).

Oil separation problem which occurs during the storage of the product will be the subject of our further research.

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