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BIOTECHNOLOGICAL ASPECTS CONCERNING THE EFFECT OF CARAWAY AND PUMPKIN SEEDS IN CHEESE

Boeriu A.E.¹, Badarau C.L.*¹

1. Transilvania University of Brasov, Braşov, Romania,
carmen.badarau@unitbv.ro

*Corresponding author: carmen.badarau@unitbv.ro

Abstract: Cheeses are some of the most consumed dairy products, being part of the daily diet of the current consumer. The nutritional value and quality of cheeses, such as pressed cheese, which are usually rich in refined carbohydrates and fats, can be improved by adding seeds to their composition in order to increase their nutritional intake.

The current study aims to improve the properties of pressed cheese obtained from cow's milk, by adding caraway and pumpkin seeds to its composition. The physicochemical properties of the product were also evaluated. It was observed that the moisture content of the product is higher compared to the control sample (PM), the addition of seeds increasing the moisture content of the samples obtained. The highest titratable acidity - 235°T was recorded in the case of the sample with the addition of both types of seeds, followed by the sample with the addition of 20% cumin seeds - PC2 230°T..

Keywords: cheese, seeds, caraway, pumpkin, milk.

1. INTRODUCTION

The ranking of products of animal origin according to economic and food importance places milk in the second position, immediately after meat; milk is considered one of the cheapest sources of animal protein with high biological value.

Worldwide, the consumption of milk and milk products per inhabitant is an important indicator of the standard of living and that is why, in civilized countries, milk production represents 30-40% of the gross income achieved in agricultural production.[1]

Considered a "food universe", milk is a complete and irreplaceable food, due to its multiple beneficial effects, such as: mineralizing action for young people; anti-calcifying action for adults; anti-toxic protection for people who work in toxic environments, etc.

The rational consumption of milk ensures good physical and intellectual development, especially in young people, increases the body's resistance to diseases, prolongs longevity and ensures a good state of health for all consumers; in women over 40, daily consumption of milk prevents the occurrence of osteoporosis. It also favors the elimination of toxic substances from the body, because it forms insoluble chemical compounds with some heavy metals. [2]

Milk contains over 100 nutrients necessary for the human body (5 types of proteins, 20 amino acids, 10 fatty acids, 4 types of lactose, 45 mineral elements, 25 vitamins, enzymes, hormones, etc.), but equally important is the fact that this product has a digestibility of the components of 100%. [1,2]

From a nutritional and biological point of view, each component of milk has its well-defined role in defending and maintaining the health of the human body, as follows:

- the protein fractions of milk are represented by albumin and globulin - 18% and casein - 82%. Milk provides the entire protein requirement for children up to 6 years old and 50-60% for those up to 20 years old. There are 20 amino acids in milk, most of them being essential, so that with a daily consumption of 250 ml of milk, the required amount of leucine, isoleucine, lysine, threonine and valine is fully covered. 50% of methionine, phenylalanine and tryptophan;

- milk lipids have a high level of digestibility, due to the relatively low melting point, but also to the content of fatty acids with a small number of carbon atoms;

lactose, is the basis of the formation of lactic acid, preventing the development of the saprophytic microflora of putrefaction in the intestine. Lactic acid favors the passage of calcium from milk into the bloodstream;

- milk is rich in calcium and phosphorus, one liter of milk contains the necessary amount of calcium for a child up to 10 years old, for a pregnant woman, as well as for a breastfeeding woman;

- large amounts of vitamins A and B are found in milk. For children, one liter of milk provides the full requirement of B vitamins and 40-80% of vitamin A, and for adults it covers 30% of the requirement for the mentioned vitamins;

- milk also contains natural hormones (estrogens and progesterone), but which have no biological activity. [3]

The energy value, as well as the biological value of milk, are dependent on its chemical composition, which, in turn, varies from one species to another. Cheese is a dairy product produced in a wide range of flavors, textures and shapes by coagulating the milk protein casein. It contains protein and fat from milk, usually cow, buffalo, goat or sheep milk. The production process involves acidifying the milk and adding enzymes, either rennet or bacterial enzymes with similar activity to cause the casein to coagulate. The solid curd is then separated from the liquid whey and pressed to obtain the finished cheese. The scalded cheeses, known in our country as pressed cheese, are manufactured according to a special technology, which consists of scalding in water at a temperature of 72-80°C the matured curd obtained from sheep's milk, cow's milk or a mixture. After salting, the cheese matures under certain conditions that ensure its characteristic organoleptic properties. [4]

Considered one of the most appreciated dairy products consumed at European level, cheese is a product that can be easily associated with various additions with sanogenic potential. In this paper, an attempt was made to improve the properties of an existing product - cheese with addition of caraway and pumpkin seeds.

2. MATERIALS AND METHODS

The sensorial parameters of samples were evaluated using the hedonic scale using points 0...5.

Moisture content was determined by weighing a certain amount of product, which is dried to a constant mass, removing the water from the product with the help of heat. The mass loss, related to 100g of product, represents the evaporated water content, i.e. moisture. 15 g of sand and a glass rod are introduced into a weighing vial, then dried at 103°C until constant mass.

After cooling, a mass of 23g cheese was weighted on an analytical balance, and placed in the ampoule where it was mixed well with the sand, using the wand. The vial was dried in an oven at 50-60 °C for 23 hours and then at 103°C for 45 hours, stirring several times with the wand during this time. The ampoule is then removed from the oven and after cooling in the desiccator, weighed. Drying in the oven is repeated for 30 min. and cool in the desiccator, until the difference between two weightings does not exceed 0.004 g. Two tests are performed in parallel. Moisture content was determined using the following formula: $\% \text{water} = \frac{m_1 - m_2}{m_1 - m} \times 100 [\%]$, where: m_1 - the mass of the ampoule with sand, the rod and the product before drying, (g); m_2 - the mass of the ampoule with sand, the rod and the residue after drying, (g); m - the mass of the ampoule with sand and the wand, (g). [5]

The acidity in a certain volume of the sample prepared for analysis is neutralized by titration with 0.1N sodium hydroxide solution in the presence of phenolphthalein as an indicator. 10 g of sample were reweighed with a

precision of 0.01 g and placed it in a porcelain capsule. It is mortared with 2.5 cm³ of water and 1 cm³ of phenolphthalein solution, until a uniform paste is obtained. The obtained samples were titrated with sodium hydroxide (NaOH) 0.1N solution with continuous stirring until a pink color appears, which persists for about 1 minute. The titratable acidity is determined using the following formula: $A = V \times 20$ [°T], where: V - the volume of the 0.1N sodium hydroxide solution used for the titration (cm³); 20 - the factor that expresses the titratable acidity of the cheese per 100 g of product. [5]

Table 1. Sample coding

Sample coding	Caraway seeds content (%)	Pumpkin seeds content (%)
PM	0	0
PC1	10	0
PC2	20	0
PD1	0	10
PD2	0	20
PCD	10	10

*The obtained samples had a mass of 1 kg. The amount of seed added was related to the weight of the blank sample

3. RESULTS AND DISCUSSION

3.1. Physicochemical features and sensory evaluation

The obtained samples were analyzed from a sensory point of view, using the scoring scale. The quality of the cheeses is determined, first of all, by their chemical composition, by the presence or absence of inhibitors, by the microbial load of the milk, which must be excluded from the manufacture of the cheeses.

Defects in products can occur if raw material of poor quality is used, if the technological process is not properly conducted, the technological parameters are not properly adjusted, and the storage conditions are not suitable. Thus, the formation of a mucilaginous crust, the development of mold and various pathogenic microorganisms is noted.

Table 2. Results of the sensory evaluation of samples

Sample	Appearance	Colour	Taste	Odour	Consistency	Average of the obtained results
PM	5	4	4	5	5	23
PC1	4	4	3	3.5	4	18.5
PC2	5	4.5	5	4.5	5	24
PD1	3	3	3	3	4	16
PD2	4	4	4.5	4.5	4	21
PCD	3.5	3	3.5	3.5	3	19.5

Table 2 shows the values obtained following the sensory evaluation of the obtained products. It can be seen how the most appreciated sample was PC2, the one with the addition of 20% cumin seeds, totaling 24 points. From

the point of view of appearance, taste and consistency, the sample obtained maximum score, being appreciated by the tasters as being the most suitable to their expectations. The PD2 sample with 20% added pumpkin seeds was next in order of tasters' preference, scoring a total of 21 points. The taste and smell were the most appreciated parameters, obtaining 4.5 points out of 5 possible.

The least appreciated samples were those with the addition of 10% pumpkin and cumin seeds, PD1 and PC1, totaling 16 and 18.5 points, not being positively appreciated by the tasters.

Table 3. Results of the physicochemical evaluation

Proba	Valoareobținută	
	Moisture content (%)	Titrate acidity (°T)
PM	43.5	200
PC1	45.2	210
PC2	47	230
PD1	44.3	205
PD2	48.4	220
PCD	52.3	235

Table 3 shows the values obtained after determining the humidity of the samples. It can be seen how the moisture content increased in proportion to the amount of seed added and the type of seed added. The addition of cumin seeds at a rate of 10% resulted in a value of 45.2% for the PC1 sample and 47% for the PC2 sample. The tendency to increase humidity is observed if the amount of cumin seeds is greater, the hygroscopic character of the seeds being reflected on the whole product. In the case of the addition of pumpkin seeds, the addition of 10% seeds provided a value of 44.3% of the moisture of the finished product, and the addition of 20% pumpkin seeds provided a value of 48.4%. The highest moisture value was recorded in the case of the sample with the addition of cumin seeds and pumpkin seeds – 52.3%. Compared to the control sample, the observed values are higher.

Concerning the results of the acidity determination of the obtained samples. It is observed how the acidity of the samples increases proportionally with the amount of seed addition added. The highest acidity – 235°T was recorded in the case of the sample with the addition of both types of PCD seeds, followed by the sample with the addition of 20% cumin seeds – PC2 230°T. Compared to the control sample, the samples with the addition of 10% cumin seeds and pumpkin seeds recorded similar values – 210°T for PC1 and 205°T for PD1.

Similar results were reported by several researchers [6], [7], [8] mentioning the fact that the addition of several types of seeds was considered beneficial, improving the physicochemical properties of obtained products.

4. CONCLUSION

Cheeses represent some of the most consumed dairy products due to the significant intake of nutrients with a positive effect on the health of the consumer. The trend of consumption of traditional products by the current consumer has boosted the industry and required the diversification of the assortment to offer products with improved properties corresponding to the consumer's expectations.

The objective of this study was to obtain new varieties of cheese, by capitalizing on the properties of seeds from the Curcubitaceae family - pumpkin seeds and cumin seeds. The content of substances with a bioactive role was reflected on the properties of the finished products, which were significantly influenced.

The working variants obtained – cheese with the addition of 10% and 20% cumin seeds, cheese with the addition of 10% and 20% pumpkin seeds and cheese with the addition of equal proportions of cumin seeds and pumpkin seeds were analyzed from the sensory and physico-chemical, and the results obtained were interpreted and compared with the values obtained for the control sample.

It was observed how, from a sensory point of view, the working variants were positively appreciated by consumers, the score given being an attribute that confirms the need to create this type of product. The most appreciated product variants were those with the addition of 20% cumin seeds and 20% pumpkin seeds, observing how a higher proportion of added seeds was liked by the tasters.

From a physico-chemical point of view, it was observed how the humidity of the obtained products was higher compared to the control sample, the addition of seeds influencing the obtained values. The acidity of the products was also higher, with a more pronounced acid character being noted in the case of the addition of cumin seeds in a higher proportion.

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