FOOD INDUSTRY

The use of red currants squash in the soft cheese technology

Yu. R. Hachak, N. B. Slyvka, O. R. Myhaylytska, V. A. Nagovska

Lviv National University of Veterinary Medicine and Biotechnologies named after S.Z.Gzhytskyj, Lviv, Ukraine
*Corresponding author. E-mail: ola75@ukr.net

Paper received 27.05.2016; Accepted for publication 10.06.2016.

Abstract. The article discusses the use of red currants squash in the soft-ripened cheese technology as coagulum and a source of biologically active substances. It was examined the organoleptic properties and soft cheese yield depending on the type of coagulant, temperature and duration of coagulation. It was established that the best option is to normalize milk coagulation with a mixture of whey from the sour-milk cheese and with red currants squash in a ratio of 1 : 1 at 95°C for 7 min.

Keywords: *technology, thermal coagulation, cheese, red currant, cheese yield, temperature.*

Introduction. Cheeses, the most common protein milk products as they contain protein concentrate and milk fat, are well consumed by human beings and have a high energy value.

Cheese-making industry is one of the fastest growing consumer segments with sustained growth in production and consumption. Nowadays the cheese market of Ukraine is presented with the following main groups: rennet cheese and melted cheese. The basis of the range consists of solid rennet cheese, the production of which is mainly used, casein and soluble proteins remain in the serum.

It should be noted that whey proteins are the most biologically valuable part of the milk proteins containing deficient amino acids lysine, tryptophan, methionine, threonine and cysteine. Thus, their use for food purposes is of great practical importance.

As relevant as ever is the production of soft cheese, based on technology which is thermal milk coagulation, meaning a common effect of high temperatures and coagulants on virtually all dairy proteins. Thermal coagulation of milk proteins helps to reduce process cycle and increase production, increase food and biological value of the product, reducing the cost of the product [1, 2, 3].

Coagulants use food acids – acetic, lactic, citric acid as well as acid cheese whey with 140°T of acidity and more. The use of food acids as coagulants has several advantages over acid whey because of the possibility to easily adjust the concentration and amount [4, 5, 6, 7, 8, 9].

Many organic acids have fruit plants: grape, quince, pear, gooseberry, cranberry, blackberry, plum, cherry, raspberry, apricot, apple, red currants cranberry. The malic, citric, tartaric, salicylic and oxalic acids dominate in most of fruit. Organic acids have a wide range of pharmacological properties and biological effects on the human body. They are involved in metabolism which is the link between metabolism of carbohydrates, proteins and fats, maintain the acid-base balance and stimulate the secretory activity of the salivary glands. Besides, they increase the secretion of bile, gastric and pancreatic juices, providing antibacterial activity [10, 11].

Red currant has been considered healthy for a long time. It contains true mineral complex of natural vitamins. There are antioxidants in large numbers with the help of which the body fights against cancer cells and the aging process. In addition, red currant is rich of retinol, tocopherol, beta-carotene, vitamin B, folic and pantothenic acid, riboflavin, thiamine, pyridoxine. Besides, red currant contains iodine and iron, a large amount of sodium, phosphorus, magnesium and potassium.

The berries of red currants contain coumarin which helps to reduce the risk of blood clots, heart attack and stroke. Truth be told, this component makes red currant so important for people. The red currant berries are rich in organic acids: succinic, malic, citric, pectins, thanks to which they have strong antiradar effect [12, 13, 14].

Objective. The aim of our research was to determine the dependence of soft cheese yield of high biological value on the duration and temperature of coagulation using as coagulant red currants squash.

Materials and methods. Experimental studies were conducted in the laboratory department of technology of milk and milk products Lviv National University of Veterinary Medicine and Biotechnologies named after S. Gzhytskyj.

For the coagulation of milk proteins were used:

• red currants squash (option 1);

• a mixture of whey from the sour cheese and squash of red currants in a ratio of 1 : 1 (option 2);

• a mixture of whey from the sour cheese and squash of red currants in a ratio of 1 : 2 (option 3).

The amount of used coagulants was 5%.

Results and discussion. Studies have shown that using a mixture of whey from the sour cheese and squash of red currants in a ratio of 1 : 2 and only a red currants squash has not given good results: a bunch got loose and too soft. There was the smallest cheese yield – 7.8% for Option 1 and 8.6% for Option 3. This can be explained by the fact that there was not enough acidity coagulant to precipitate the milk proteins.

The highest cheese yield was obtained with the use of the following coagulants: mixtures of whey from the sour cheese and squash of red currants in a ratio of 1 : 1, namely 14.1%.

We know that structurally mechanical properties and milk-protein clots largely depend on the milk thermal conditioning. Therefore, rational selection of temperature conditions will enhance the decrease of the deposition of separate protein fractions. In view of this fact, there was conducted a series of experiments during which there was determined the dependence of the cheese yield on temperature. Thus, coagulation of proteins was carried out within a temperature of 75°C to 100°C with intervals of 5°C. The heating duration was 10 minutes.

The research results are presented in table. 1. The table. 1 shows that the highest yield of all selected coagulants was observed at 95°C, that corresponds to the traditional technological production of soft cheese. It may be explained because of the fact that it is observed

Table 1. The cheese yield under the different coagulation temperature

Coagulation temperature, °C	Cheese yield, %		
	Option 1	Option 2	Option 3
75	6,5	12,2	7,0
80	6,8	12,8	7,4
85	7,0	13,4	7,7
90	7,4	13,7	8,2
95	7,8	14,1	8,6
100	7,3	13,8	8,2

maximum coagulation of milk proteins at this temperature, and consistency becomes dense, homogeneous and plastic.

Under 85°C the clot looked flabby, fine, but protein partially coagulated and much of it went out with serum, resulting in cheese yield decrease.

At the same time, increasing the temperature above 95 °C helped to reduce product yield, and the consistency of clot became too thick, had the lowest capacity and, therefore, lower humidity due to prolonged exposure to the protein globules of lactic acid under the influence of high temperatures.

The duration of coagulation of milk proteins is an important factor in the production of soft cheese. Prolong exposure enhances the coagulation and increases output of product. Thus, we should investigate the dependence of cheese yield on the duration of coagulation.

The proteins coagulation was performed at 95°C. The heating duration was 3 to 15 minutes with 4 min for intervals.

In table 2.there is shown the dependence of the cheese yield on the duration of coagulation.

Table 2. The cheese yield within the different period of coagulation

The period of coagulation	Cheese yield, %		
	Option 1	Option 2	Option 3
3	7,4	13,6	8,2
7	7,8	14,1	8,6
11	7,3	13,9	8,3
15	7,0	13,3	7,8

The table. 2 shows that the highest yield was obtained by heating the mixture for 7 minutes. It may be stated that less than 7 minutes of coagulation is not enough to form a thick plastic clot and receive the lowest yield of the product. If there is an increase in the period of heating up to 15 minutes, the clot will be too dense and dry.

Conclusions. Having analyzed the results of the research, it may be asserted that the use of red currants squash in the technology of soft cheese production combined with whey as coagulant in the ratio of 1 : 1 is appropriate because it allows to get high cheese yield with functional properties.

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Использование пюре краснойсмородины в технологии мягких сыров

Ю. Р. Гачак, Н. Б. Сливка, О. Р. Михайлицкая, В. А. Наговская

Аннотация. В статье рассмотрена возможность использования пюре красной смородины в технологии термокислотных сыров как коагулянта и источник биологически активных веществ. Исследованы органолептические показатели и выход термокислотных сыров в зависимости от вида коагулянта, температуры и продолжительности коагуляции. Установлено, что оптимальным является коагуляция молока нормализованного смесью сыворотки из-под творога и пюре из смородины красной в соотношении 1:1 при температуре 95 ° С в течение 7 мин.

Ключевые слова: *технология, термокислотная коагуляция, сыр, красная смородина, выход сыра, температура.*