Journal homepage: www.fia.usv.ro/fiajournal
Journal of Faculty of Food Engineering,
Ştefan cel Mare University of Suceava, Romania
Volume XIII, Issue 1 – 2014, pag. 68 - 73

ASPECTS CONCERNING THE OBTAINMENT OF CHEESE WHEY CREAM FROM GOAT'S MILK WITH ONION AND DILL

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Received 15th December, accepted 5th March 2014

Abstract: *Whey is a valuable by-product resulting from the manufacture of cheese, which in our country is not fully exploited. The composition of the whey will vary depending on the characteristics of the milk from which it is obtained and the cheese manufacturing process. Whey contains the most soluble components of milk and casein and fat residue. This paper proposes a simple way to capitalize whey cream goat milk curd with onion and dill.*
Cheese whey cream from goat's milk with onion and dill contains only natural ingredients, whey being obtained after acidification of milk with natural goat curd, onion and dill. The product is an organic functional food, not using any preservatives, additives or genetically modified organisms. The taste was smooth and the soft structure was obtained by slowly heating the whey at a maximum temperature of 80°C. The product was analyzed for sensory, physicochemical points of view and determining the shelf life. Finally it was proposed as a way of packaging and marketing the finished product.

Keywords: *serum proteins, immunoglobulins, functional foods, eco-innovative product*

1. Introduction

Legends say that the gods of Olympus were raised with goat milk, its health benefits being known since antiquity. Cheese whey cream with onion and dill focuses and amplifies the healing properties of goat milk [1, 2, 3].
Cheese whey cream from goat's milk contains only natural ingredients, whey obtained after acidification of milk with natural rennet kid, onion and dill. No preservatives, additives or genetically modified microorganisms are used. The creamy taste and delicate structure is obtained by slowly heating the whey at a maximum temperature of 80°C [4, 5].
World production of cheese is 17 million tons obtained by processing over a third of world milk production, which results in about 145÷153 x 10^6 tons of whey. It is estimated that only half the amount of whey produced is used for human food or animal feed, the remainder being discharged through sewage leading to increased environmental pollution [6, 7, 8, 9, 10]. A traditional whey recovery solution is to obtain cheese from whey.
Cheese whey is obtained both from the production of cheese from cow's milk and from the manufacture of cheese from sheep's milk, as well as the whey from goat's milk cheese. To achieve the cheese whey, whey is heated to a temperature of less than or equal to 80°C and maintained at this temperature, in this case favours the precipitation of most of the serum proteins, which causes the fat from whey, which is accumulated in whey heated surface in the form of agglomerates which are collected in a cedilla, in which after draining the whey, the cheese whey cheese is formed by autopressing [11, 12]. Generally, the cheese whey is accumulated in the cedilla

as round balls with a mass of 2-3 kg, the product having a pleasant sweet taste, smooth creamy white texture. Fresh cheese whey has about 60% water and 50% fat in dry matter [13, 14, 15].
This paper proposes a study of process obtaining cheese whey cream from goat milk with onion and dill.

2. Materials and Methods

The technological process for obtaining cheese whey cream with onion and dill meet the specific process of obtaining cheese whey, the innovation in this case being the type of milk used, and added ingredients onion and dill.
For the above product, the following manufacturing recipe was used (Table 1):

Table 1
Manufacturing recipe for 1000 g „Cheese whey cream from goat milk with onion and dill"

Raw material	Quantity/1000g finished product
Whey	33 L
Onion	40 g
Dill	30 g
Salt	30 g

The *raw material* used in cheese whey producing is whey, which results in large quantities in the manufacture of cheese via rennet coagulation or by acidification with lactic cultures. The whey obtained by the above processes is characterized by the specific sensorial properties:
- aspect - whey is a yellowish green, opalescent liquid;
- consistency - fluid, viscous not accepted;
- odour and taste - sour, specific to lactic fermentation.

The composition of the whey will vary depending on milk characteristics and on the manufacturing process of the main product. The whey contains the most soluble components of milk and casein and fat residue. Often, during the manufacturing process, number of substances are added in the milk (calcium chloride, sodium chloride, acid dyes, and so on), which is found in the whey.
There are two types of whey:
- sweet whey, derived from enzymatic coagulation of milk;
- acidic whey, from the production of fresh or soft cheeses or the production of lactic casein

Acid whey composition is presented in Table 2.

Table 2
Chemical composition (%), pH and protein content of the whey from the milk of goats

Characteristic	Quantity [%]
Dry substance	7.07±0.09
Lipids	0.84±0.18
Proteins	0.63±0.03
Ash	0.57±0.01
Lactose	5.02±0.24
pH	6.34±0.29

Whey proteins are the most valuable in terms of nutritional value, and are also called fast proteins. They are rich in sulphur amino acids, lysine and tryptophan. Serum proteins are those which remain in the whey after precipitation of caseins at pH 4.6. Serum proteins (whey) are more water soluble than casein and are more prone to thermal distortions. The distortion cancels their ability to bind water.
The following are the main whey proteins:
- β-lactoglobulin has a molecular weight of 18000 and contains 162 amino acid residues. This protein includes eight genetic variants and represents half of the total whey proteins. The protein exists as the secondary structure and normally exists as a dimmer. At the isoelectric point (pH 3.5 to 5.2) dimmers may be assigned to octomeri, but at pH 3-4 they are dissociated to monomers. Milk β-lactoglobulin has the ability to stoichiometric fix retinol (vitamin A1) and

very strong complex with benzo-(a) pyrene, a potent carcinogen substance;
- α-lactoalbumine has molecular weight 14000 and contains 123 amino acid residues.

This protein has 8 cysteine residues that are involved in the formation of intramolecular-SS- connections. It also contains 4 tryptophan residues. α-Lactoalbumine has an ordered secondary structure and a spherical, compact tertiary structure. The heat denaturation and pH less than 4, milk α- lactoalbumina releases linked calcium;
- immunoglobulins in colostrum and milk obtained from circulating immunoglobulins in the blood stream. In colostrum and milk are IgG immunoglobulins (lg lg G1 and G2), LG and LG M. There are sensitive differences between the content of immunoglobulins in colostrum [11, 12].

Onion is a biannual plant of the genus Allium, rich in active principles which explain its many therapeutic uses. The onions are found organosulphur compounds, flavonoids, essential oils, organic acids, vitamins (C, B1, B3, B6, B9, PP, E, etc.), carotenes, fitoncide, minerals (calcium, iron, sulphur, iodine, silicon, chromium, magnesium, potassium and so on). The chemical composition of onions is presented in Table 3.

Research has shown that onion genus Allium has more effect on the body such as:

- diuretic properties due to fructosan rich content that has the capacity to produce about 3l urine / day;
- hypoglycaemic;
- property to reduce cholesterol and regulate blood pressure;
- antimicrobial, antifungal, anti-inflammatory.

Dill is an annual plant with a short life of the Anatheum genus, species graveolens. It is rich in vitamin A, B, C, chlorophyll, essential oils, and tannins (eg a teaspoon of fennel seeds contain more calcium than a cup of milk). It can stimulate digestion, antiseptic effect, combat hiccups, diuretic, depurative.

The essential oil is composed of carvone, felandren, limonene, apiol and terpene hydrocarbons.

Dill leaves have tonic properties of appetizer and stomachic nature, promoting diuresis and elimination of gas and the fennel grains are strongly carminative, being important for their emmenagogue properties (regulating menstruation).

Table 3

Onion's chemical composition

Medium composition for100 g	
Energy	3 kcal
Water	89 %
Glucids	7.1 %
Lipids	0.2 %
Proteins	1.3 %
Fiber	2.1 %
Calcium	80 mg
Magnezium	18 mg
Potasium	250 mg
Iron	1 mg
Vitamins	38 mg

The chemical composition of dill is presented in Table 4.

Table 4

Dill's chemical composition

Components	**Quantity/100g**
Carbohidrates, with fiber	7 g 2.1 g
Lipids	1.1 g
Proteins	3.5 g
Tiamine (B_1)	0.1 mg
Riboflavine(B_2)	0.3 mg
Niacine (B_3)	1.6 mg
Pantotenic acid (B_5)	0.4 mg
Vitamine B_6	0.2 mg
Folic acid (B_9)	150 µg
Vitamine C	85 mg
Minerals	1.5 g
Energy value	43 kcal

Transport. Whey is transported by tankers to the factory. The material for these

means of transport is in many cases, aluminium, stainless steel.

Quantitative reception. The total amount of whey entering the mill is received quantitatively. This can be done in two ways:

- volumetric: determining the amount of whey is given taking into account the temperature. This type of measurement can be achieved in two ways: either by hand or by measuring the levels of whey in tanks, and by means of flow meters known as galactometers, the main advantage is to measure the volume and discharge at the same time.
- gravimetric: is to empty tanks or drums in the basin scale, followed by a read-on-screen quantity control. The system of measurement is more accurate although the disadvantage of the batch.

Quality reception. Raw material before entering the factory must be determined based on its quality and to sort, this reception consists of sensorial examination and laboratory tests.

Heating whey. It is performed in special valves made of steel used in the food industry. Heating the whey is carried out at temperatures up to 80-90°C and maintaining this temperature, in this case favours the precipitation of most of the serum proteins that involve whey and fat which accumulates on the surface of the particle resulting in the cheese whey.

Filtering. Made using cloth filters for food industry that separate the cheese from the whey left. Cheese whey collection is carried out with a cedilla, which forms spherical pieces with a weight of 1-2 kg. When all of the cheese whey is separated from whey, and hanged onto stainless steel pillars to drain for a few hours.

Preparation of the mixture. The cheese whey obtained in the desired quantity is dosed according to the recipe and bring in a mixing machine for operation with onion, dill and salt. The mixing takes place until a homogeneous mass is obtained and the secondary raw materials are distributed uniformly throughout the mass of the product.

Packaging. The type of packaging for this product is in the form of glass bottles with a capacity of 130 g. This type of package has been chosen since:

- it is insoluble in water and resistant to acids and bases;
- is chemically inert in contact with food;
- impermeable to gases, liquids, vapours, scents, micro-organisms;
- easy to clean;
- is stiff as keeps its shape, does not contribute to product deterioration.

But the greatest advantage of glass packaging is that it does not harm the environment, but can be recycled and reused.

Storing "Cheese whey cream from goat milk with onion and dill" is done in cold storage at a temperature of 4 ± 2°C. Delivery of the commercial product made under the law in force with vehicles equipped with refrigerator.

3. Results and Discussion

Technical specifications refer to "Cheese whey cream from goat's milk with onion and dill" obtained by heating the whey from the production of cheese from goat's milk and adding ingredients.

Ingredients used to obtain cheese whey cream are:

- onion, at a rate of 4%;
- dill, in a proportion of 3%.

Raw and auxiliary materials used to obtain cheese whey cream, whey and vegetables correspond to product's technical documents and meet all sanitary and veterinary regulations in force in our country.

The product is packaged in jars of 260 g gross weight and net weight of 130 g.

Sensorial properties are shown in Table 5.

Table 5
Sensorial properties of the product " Cheese whey cream from goat milk with onion and dill

Characteristics	Admission requirements
Aspect	Homogeneous
Colour	Whitish - green
Consistency	Creamy
Taste and odour	Pleasant, salty enough, characteristic for the added ingredients

Table 6
Physical-chemical properties of the product "Cheese whey cream from goat milk with onion and dill"

Characteristics	Value	Analysis method
Fat/S.U., % min.	62	*SR ISO 3433:2009*
Humidity, % max.	59	*SR EN ISO 5534:2004*
Proteic substances, % min.	10	*SR EN ISO 8968:2004*
NaCl, % max.	3	*SR ISO 57651:2008*
Acidity, °T max.	20	*SR ISO 6092:2008*

Minimum durability of the product "Cheese whey cream from goat milk with onion and dill" is settled on 14 days of the packaging according to the following criteria:

- moisture content according to analysis determined that moisture product is 59.01%, which gives a lower shelf-life;
- acidity: acid was determined at 2 days intervals of the packaging. It was found that it did not change for 14 days from the packing (20°T), but at the 8th determination the acidity reached 25°T (which leads to deterioration of the product).

Nutritional information per 100 grams of product "Cheese whey cream from goat's milk with onion and dill" are:

- *protein* *10.19 g*
- *fat* *25.38 g*
- *carbohydrates* *11.28g*.

According to the above equation results:

$$Qn = 10.19 \cdot 4.1 + 25.38 \cdot 9.3 + 11.28 \cdot 4.1$$

$$Q_n = 324 \text{ Kcal/100g}$$

4. Conclusions

Consumption of dairy products in Romania is steadily increasing; manufacturers are oriented towards diversification of product assortments, especially traditional cheeses.
Production and processing of milk and thus the obtaining and processing of whey must strictly comply with legislation. Due to its composition, whey is a valuable by-product that can be exploited by obtaining complex functional foods for human nutrition.
Taking special care to detail, using raw materials of the highest quality, the paper proposes dairy manufacturers an eco-innovative product designed to please all consumers.
"Cheese whey cream from goat's milk with onion and dill" was made from a traditional assortment of cheeses whey, with added onions and dill finally obtaining a finished product with superior quality and nutritional psycho-sensorial properties.
Another innovative element proposed in the paper is the use of glass jars for packaging because it presents multiple advantages of glass in food packaging. Also, by using this type of packaging it increases the shelf life of the product, whey cheeses being products with a low shelf life, susceptible to microbiological contamination due to high water content (about 80 %).

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