

The Effective Technology of Processing and Storage Fermented Milk Product from Camel Milk

¹M.T. Tokhanov, ²M.A. Berdikulov, ¹D.A. Baimukanov and ³L.S. Kozhamzharova

¹Scientific-Research Institute "Problems of Agriculture and Water Resources,"
South Kazakhstan State University Named M.O. Auezov, Shymkent, Kazakhstan

²Department of Innovation and Technology Commercialization South Kazakhstan
University Named M.O. Auezov, Shymkent, Kazakhstan

³Department of Biology, Faculty of Water Resources, Environment and Construction,
Taraz State University Named After M.Kh. Dulaty, Taraz, Kazakhstan

Submitted: Sep 26, 2013; **Accepted:** Oct 31, 2013; **Published:** Nov 3, 2013

Abstract: The Republic of Kazakhstan is camel breeding country in the world where annually increases livestock to 10 %. Due to this, there is a positive dynamics in increase of production of camel milk. However, due to the lack of scientific developments in the technology of production of dairy products from camel milk production of the dairy product does not meet the international requirements of quality and management, protein ratio (the ratio of fat and protein in milk), which complicates its use as a consumer product in the world market and production of baby food.

Key words: Milk • Technology • Fat • Protein

INTRODUCTION

Camel milk is curative natural product, capable of satisfying the needs of the human body in micro-and macro-elements, vitamins of group «B» and «C». Caloric value of camel milk - 911 kcal per 1 l, at the same time, calorie Mare's milk is to equal - 528 kcal and cow's milk only 660 calories. In addition, camel milk is missing protein allergen affecting the pancreas, compared with cow's milk. From camel milk can produce more than 30 kinds of medical and dietetic dairy products that are in demand both on the domestic and international markets [1]. According to scientific data shubat obtained from camel milk contains antibodies that have properties of natural immunomodulation and can be effectively applied as a Poly-vitamin product in treating a variety of diseases such as chronic diseases of the respiratory organs, digestive organs, gastritis, diseases of liver, biliary tract, the small and large intestine, diabetes, psoriasis [2].

According to the academician of NAS RK T.Sh. Sharmanov Director of the Academy of nutrition of the Ministry of Health, the clinical effect is obtained in the

treatment with shubat the following diseases: chronic tuberculosis, diseases of the liver, inflammation of the gallbladder, biliary dyskinesia. Declining local pain symptoms, improvement of bile outflow, decrease of stagnation, inflammatory processes in the biliary passages gallbladder [3].

The data of the Russian and Western scientists, if used daily, 0.5 liters of shubat 30 minutes before a meal, within six months, can facilitate treatment of such diseases as cancer, AIDS, Alzheimer's disease, diseases of the gastrointestinal tract and cardiovascular system [4]. Based on the healing properties of camel milk decision by the Department of agriculture and food industry of the UN to ensure the population of Europe, America, Africa and Asia cultured milk products from camel milk. Healing dairy products from camel milk interested leading companies - producers in the dairy industry of Japan, the EU, the USA and Australia [5].

Topicality: In connection with the increasing demand of domestic and world market for dairy products from camel milk is urgent expansion of assortment of production from

camel milk. In order to address effectively the issue of transportation, must be received shubat subjected to deep processing by the method of cryogenic sublimation for obtaining of dry shubat from camel milk, preserving organoleptic, biochemical properties and mineral composition during restoration, which will be in demand among customers at the domestic and foreign markets.

Scientific and Practical Significance: Improved technology to obtain shubat of camel's milk is pasteurized, preserving organoleptic properties and biochemical composition of inherent natural milk. Developed an innovative technology cryogenic sublimation shubat in the dry powder. The developed technology of reception of a qualitative shubat and dry powder shubat received 2 innovation patents of the Republic of Kazakhstan. The resulting natural shubat and dry powder shubat tested by independent experts of JSC «Academy of nutrition» The Ministry of health of the RK, Almaty [6].

Camel's milk is high bactericidal action. The initial acidity 19-220 TONS at room temperature is maintained within 48 hours then comes the process of turning sour. In the traditional technology of individual and peasant farms at preparation of shubat camel milk is not pasteurized, in connection, with more than 80% of shubat has a high bacterial colonization of more than 1.5 million in 1 ml of milk. Moreover, camels and cattle exposed to diseases tuberculosis and brucellosis.

For shubat production according to Standard RK 166-97 «camel Milk for processing in shubat» you must use pasteurized camel milk. However, so far not worked through pasteurization temperature mode. The people there are the opinion that the pasteurized camel milk loses all of their qualitative indicators.

There is scientific evidence that the camel's milk is pasteurized at the temperature of 85-87°C without time. However, this mode of temperature pasteurization is partly inadmissible because it does not give the opportunity to receive shubat with silky taste senses. According to P.V. Kugenev when preparing shubat use camel milk, but not the duration of pasteurization [6].

Camel shubat, its biochemical properties - perishable product. Due to high acidity through 4-7 days sour, even when stored in refrigeration chamber at a temperature of +4-6°C and becomes unfit for use. Almost impossible to transport long distances. In connection with this, definition of optimal variants of processing of milk pasteurization after milking camels acceptable in the conditions of farms, peasant farms and private households to supply to the consumers is relevant.

One of the most effective and simplified methods of disinfection of milk from bacteria is the pasteurization of freshly drawn milk.

MATERIALS AND METHODS

Method of reduction of bacterial contamination, receiving high-quality shubat was conducted selection of optimum regimes of pasteurization (at different temperatures) milk. Process of pasteurization camel milk at a temperature of 55°C duration of 20, 30, 40 minutes; at a temperature of 65°C duration of 10, 15, 20 minutes at a temperature of 75°C duration of 3, 6, 9 minutes.

As a result of experimental research showed that milk appropriate standards 166-97 filtered through a double layer of cheesecloth and pasteurized at the temperature of 75°C within 3 minutes, then cooled to 26°C. Pasteurized chilled milk is poured into a wooden 100 lit barrels (beech, oak) in the amount of 60 l and add shubat leaven in the amount of 20 HP, the mixture is stirred with a slotted spoon for 25 minutes. After 15 hours ripe shubat intensively mixed for 15 minutes. The finished product is cooled to +8°C and is bottled in glass or plastic bottles with a volume of 1.0 - 2.0 lit, as is customary in the dairy industry. The result is shubat with alcohol content of 0.8-0.9 percent, homogeneous consistence, pleasant taste perception and smell of sour milk, thick, dense soda, homogeneous without flakes, velvety, with small foam (Fig. 1).

Results of physical and chemical analysis of shubat have shown: a mass fraction of fat of not more than 4.5%, fraction of total mass of protein-3.6%, mass fraction of carbohydrates is not more than 6.0%, acidity 95-1250T. Table 2 presents the microbiological parameters in a prepared shubat.

Conducted microbiological studies of shubat showed the total number of viable microorganisms 0.3 million, while the permitted rate of 0.5 million CGB (coliform) and pathogenic microorganisms were not identified. Class of bacterial contamination corresponds to the 1st class [7].

However, fresh cooked shubat has a relatively short shelf life. After 2-3 days it begins with the active process of fermentation. One of the main problems of dairy products from camel milk is the inability to deliver quality natural shubat consumers and export, due to the limited period of storage of shubat.

On the basis of complex research works on perfection of traditional technologies of production, storage and processing of camel's milk for the first time in practice of domestic camel developed new competitive not have any



Fig. 1: Natural shubat from camel milk

Table 1: Physical and chemical indicators of shubat from camel's pasteurized milk

Name of indicators	Mass fraction	Designation of normative documents on test methods
Mass fraction of fat, % not more	4.5	1. GOST standard 58-67-90 PN 09-39-99
Mass fraction of protein, %, not less	3.6	1. GOST standard 23327-98 PK 09-41-99
Mass fraction of carbohydrates, % not more	6.0	1. GOST standard 3628-78
Mass fraction of moisture, %, no more	86.5	1. GOST standard 3626-73
Acidity	95-125	1. GOST standard 3624-92

Table 2: Microbiological indicators shubat received from pasteurized camel milk

Name of indicators	Actually received	Permissible norms	Designation of normative documents on test methods
The total number of viable microorganisms 1G product	$< 1.5 \times 10^2$ 0.3 mln.	$< 5 \times 10^4$ 0.5 mln.	GOST standard 9225-84
CGB (coliform) at 0,1 cm product	not found	not found	GOST standard 9225-84
Pathogenic microorganisms	not found	not found	GOST standard 305 19-97

analogue advanced technologies of deep processing of natural shubat with high nutritional value as a dry powder shubat.

Technique of natural shubat is carried out on technological process. 4 day shubat is poured into the capacity - 1l, height, 5-10 mm, fast frozen irrigation of liquid nitrogen for 3-5 minutes, frozen shubat is placed in a vacuum chamber freeze installation UKS-3. The pumping process of production is made stepped pressure lowering in freeze-drying chamber with a vacuum pump AP-20 6 stages of gradual submission of heating the pan. At low pressure of the product stands out a pair of moisture and temperature of the product is reduced. To ensure the process of acceleration of sublimation to a frozen product is fed to the heat, as a result of water from the ice passes into the vapor state, the moisture of the product is extended in a vaporous state. The process of sublimation of receiving dry powder shubat is held to residual moisture content of powder 4%. All processes sublimation is controlled by special devices [8-9].

As a result of experimental studies found that the production of dry powder shubat with humidity of up to 4%, the method of cryogenic vacuum drying at stepwise lowering the pressure in cryogenic freeze-vacuum chamber, where the optimal temperature modes of cooling and pressure freeze-drying chamber (Fig. 2), dry powder

shubat maximally keeps taste qualities inherent natural product and biochemical composition of: protein, fat, vitamins and micro - macro elements, preserving all the food values shubat [8].

The Process of Obtaining a Dry Powder Shubat



Fig. 2: Sublimation installation in the process of drying regime shubat



Fig. 3: The Lyophilized powder shubat

Table 3: Nutritional value in the dry powder shubat.

No	Name of indicators	Dry powder shubat		Designation of normative documents on test methods
		Vacuum drying	Cryogenic sublimation	
		Nutritional value in % 100 grams.		
1	Protein	23.3	30.29	GOST standard 23327-78
2	Fat	39.6	48.4	GOST standard 5867-90
3	Humidity	2.2	4.62	Skurikhin I.M, 1987
4	Energy value kcal/100g	561	590	SanPiN 04.01.071.03
5	Vitamin C, mg/100g	7.7	49.87	S ' 09-30-90



Fig. 4: Sublimated dry shubat

As a result of experiments dry powder shubat received cryogenic sublimation drying, are of a light, loose amorphous-granular mass of white color (Fig. 3). Dry powder shubat (Fig. 4) preserves the natural qualities for more than 2 years, is transported by vacuum package in any part of the world without special refrigerating chambers.

Dry powder shubat is obtained when cryogenic sublimation on food, energy and vitamin composition is highly concentrated product (Table 3).

Analysis of biochemical properties of the powder shubat, obtained by vacuum sublimation and cryogenic sublimation. Experimental dry powder shubat cryogenic sublimation confirmed by the certificate in CJSC "Academy of nutrition", "Nutrition Test" from 27.10.2010 No. 2 - 16/479-11.

The content of vitamin A is 0.278 mg/100g, E – 1.043 mg/100g, with 49.87 mg/100g.

Vacuum drying safety of vitamin A makes 0.037 mg/100g, E - 0.12 mg/100g and - 7.7 mg/100g (Table 3). When the cryogenic sublimation dry powders shubat obtained for 5-6 hours, that is 2 - 2.5 times faster than the vacuum drying, while retaining all of the original taste. As is known, the evaluation of the quality of any type of drying depends on saving the original properties of drying product.

CONCLUSION

Improved technology of obtaining of qualitative shubat of camel's milk is pasteurized, preserving organoleptic properties and biochemical composition of shubat inherent natural camel milk. The developed technology of cryogenic sublimation shubat in the dry powder of preserving all natural qualities shubat.

Results of physical and chemical analysis of shubat have shown: a mass fraction of fat of not more than 4.5%, fraction of total mass of protein-3.6%, mass fraction of carbohydrates is not more than 6.0%, acidity 95-1250T.

Dry powder shubat received cryogenic sublimation drying, are of a light, loose amorphous-granular mass of white colour. Dry powder shubat is obtained when the cryogenic sublimation on food, energy and vitamin composition is highly concentrated product preserving all of vitamins, especially vitamin C – 49.87 mg/100g. The content of vitamin A is 0.278 mg/100g, E – 1.043 mg/100g, With 49.87 mg/100g.

Vacuum drying safety of vitamin A makes 0.037 mg/100g, E - 0.12 mg/100g and - 7.7 mg/100g.

REFERENCES

1. Musayev, Z.M., 2001. Baimukanova A. Camel breeding. Breeding achievements of Kazakhstan (the creators of breeds of animals) -Almaty: Bastau, pp: 240-245.
2. Camel's milk, (www.mignews.com) from 15.06.2010
3. Sharmanov, T.S. and A.K. Zhangabylov, 1991. Medicinal properties and kumys, shubat. - Alma-Ata Gylm, pp: 176.
4. Chomanov, U.C.H., T.C.H. Tultabaev and R. Tarakbaeva, 2003. Fermented beverages from camel milk. Kazakhstan, 1: 16-20.
5. Kugenev, P.V., 1982. Products from camel milk. Moscow: University of the Patrice Lumumba Friendship of People, pp: 70-71.

6. Innovative patent RK 20925, 2009. A method of obtaining shubat. Publ.
7. Innovative patent RK 20926, 2008. Way to obtain dried milk powder shubat. Publ.
8. Protocol of tests No 2-16/311, 2010. Shubat of camel's milk is pasteurized. JSC "Kazakh Academy of Nutrition", LLP "Nutrition Test".
9. Protocol of tests No 2-16/479-11, 2010. Dry powder shubat received cryogenic sublimation drying. JSC "Kazakh Academy of Nutrition", LLP "Nutrition Test".