

Some features of the production of pickled cheeses using an the example of brynza from goat's milk and its mixture with cow milk

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Abstract.

The purpose of this research is examination of the technological properties of milk from various types of farm animals and especially dairy goats, as well as the possibility of producing brine cheese-brynza from goat's milk and its mixture with cow milk and recommendations for farmers and entrepreneurs interested in this issue.

Key words: brine cheese, cheese - brynza, mass fraction, consistency, acidity, density, statistical reliability, organoleptic characteristics, flavor and aromatic fillers.

INTRODUCTION.

Goat cheeses are considered delicious for a number of their characteristics. This group includes cheese of any density - both soft and hard. The hallmark of such cheeses is the presence of a shriveled crust and the characteristic specific flavor of goat's milk. Brine cheese belongs to this group of cheeses. One of the features of the technology of pickled cheeses is the use as a raw material along with cow's, goat's and sheep's milk. In the last decade, Russia has seen a fairly stable growth in the production of pickled cheeses, the volume of which currently reaches over 22 thousand tons. However, the most pickled cheeses are produced in the North-Caucasus and Southern Federal Districts (45 and 18%) [1,2].

From this statistics, it follows that brined cheeses still belong more to traditional national cheeses, since in other federal districts their production is only about 3%. Among the whole group of brine cheeses, the most popular and demanded is cheese - brynza, which is produced mainly from cow's milk. However, due to the emerging trend of dairy goat production in Russia, there is an increase in the production of goat's milk, which, by the sum of its positive properties, is suitable for cheese and especially for pickled cheeses [3].

According to a number of literary sources, the clot obtained from goat's milk has a high brittleness, and the whey is more turbid, with a high content of fat and protein. In this regard, the positive effect of the introduction of higher doses of calcium chloride, which facilitates a more rapid clotting and a more dense clot. At the same time, syneresis and dehydration of the cheese mass are improved [4].

The rheological characteristics of a goat milk's clot are somewhat lower, so a clot is recommended to be cut slightly overexposed [5,6]. In the processing of goat's milk it is also advisable to carry out its deep ripening or to make increased doses of bacterial starter culture. Thus, goat's milk is a source of good for cheese raw material, and from it, or from its mixture with cow's milk, high-quality cheeses without significant changes in technology can be produced. The production technology of pickled cheeses with all their diversity is one of the most simple.

As the «brine cheese», brynza got the widest dissemination. For the first time, cheese is mentioned on the territory of the Arab East in various legends, as well as in the countries of the Balkan Peninsula. The word "brynza" in translation from the Romanian language means "sheep cheese", because in it's production sheep's milk was used mainly [7].

Currently, in the production of cheese - brynza cow's, goat's, buffalo's and sheep's milk is used as well as their mixtures. Cheese-brynza is the most important component of many national cuisines. In Russia, there is also a fairly stable growth in the production of brine cheeses, including brynza, both from cow's and goat's milk. In many ways, the production technology of goat's milk products is similar to the technology of production from cow's milk. However, due to a number of features of its composition and properties, there are a number of significant differences that must be taken into account [8,9].

MATERIALS AND METHODS.

In accordance with the requirements of GOST R 53421-2009 "Brine Cheese" for brynza from cow's milk, the mass fraction of fat in the dry matter should be at least $45.0 \pm 1.6\%$ and the mass fraction of moisture should not exceed 55%. There is currently no evidence-based standard for brynza from goat's milk, or it is under development.

In the laboratory production of cheese - brynza from goat's milk at the department of technology of meat and dairy products, we used whole unnormalized goat's milk, as well as cow's milk and a mixture of cow's and goat's milk in a ratio of 70:30%.

In the production of cheese in the laboratory natural milk of cows and goats was used without normalization. Cheese-brynza was produced by traditional technology of brine cheese production.

The indicators of chemical composition (mass fraction of fat, mass fraction of protein, dry skimmed milk residue, dry matter), as well as physico-chemical indicators - density and acidity were determined in the raw milk. The research was carried out according to generally accepted methods, specified in the requirements of regulatory documentation for determining the quality of raw milk (GOST 31449-2013 Raw cow's milk. Technical conditions).

Finished cheeses were investigated by organoleptic indicators, the chemical composition was determined (mass fraction of fat in dry matter, mass fraction of moisture). The research was carried out according to generally accepted methods specified in the requirements of regulatory documentation for determining the quality of brine cheeses (GOST R 53421-2009 Brine cheeses).

The determination of the ultimate shear stress (Q (kPa)), as the main indicator of the consistency of the finished product, was performed on a laboratory cone penetrometer according to the Volarovich method.

Table 1 - Technical characteristics of the raw milk used in the experiment

Indicators	Raw milk		
	Cow's milk	Goat's milk	Mix of cow's and goat's milk (70:30%)
Mass fraction of fat, %	4,70	5,15	4,92
Mass fraction of protein, %	2,94	2,96	2,95
Mass fraction of SOMO, %	8,72	8,85	8,78
Mass fraction of solid, %	13,42	14,0	13,7
Density, kg/M^3	1028,8	1029,0	1028,9
Acidity, °T	21,0	20,0	20,7

Table 2 - Physical and chemical indicators of cheese-brynza

Indicators	Requirements GOST R 53421 "Brine Cheese"	Variants		
		Cow's milk	Goat's milk	Mix of cow's and goat's milk (70:30%)
Mass fraction of fat, %	-	23,8	25,3	24,1
Mass fraction of moisture, %	No more than 55	47,3	54,8	49,7
Mass fraction of fat in solid, %	No less than 45	45,2	55,9	47,9
Consistency, Q (kPa)	-	8,7	22,1	14,4

Table 3 – The organoleptic evaluation of cheese - brynza

Indicators, score	Min – Max	Variants			
		Cheese from cow's milk		Cheese from goat's milk	
		M \pm kg	C _v , %	M \pm kg	C _v , %
Look	1-3	2,90 \pm 0,07	10,3	2,75 \pm 0,12	19,5
Taste and smell	8-10	9,45 \pm 0,17	7,8	8,85 \pm 0,19	9,6
Consistency	1-3	2,90 \pm 0,07	10,3	2,45 \pm 0,17	3,2
Figure	1-2	2,00 \pm 0	0	1,90 \pm 0,07	15,8
Color	1-2	1,95 \pm 0,05	11,2	1,95 \pm 0,05	11,2
Total	12-20	19,10 \pm 0,25	6,0	17,9 \pm 0,30	7,5

Table 4 - The organoleptic evaluation of cheese – brynza in the oil filler

Indicators, score	Min – Max	Variants			
		Cheese from cow's milk		Cheese from goat's milk	
		M \pm kg	C _v , %	M \pm kg	C _v , %
Look	1-3	2,80 \pm 0,11	14,5	2,85 \pm 0,09	12,3
Taste and smell	8-10	9,33 \pm 0,16	6,6	9,60 \pm 0,17	6,6
Consistency	1-3	2,80 \pm 0,11	14,5	2,80 \pm 0,11	14,8
Figure	1-2	1,93 \pm 0,07	13,4	2,00 \pm 0	0
Color	1-2	1,93 \pm 0,07	13,4	2,00 \pm 0	0
Total	12-20	18,87 \pm 0,20	3,9	19,27 \pm 0,16	3,1

RESULTS AND DISCUSSION.

The research has shown that the basic physical and chemical characteristics of raw milk material are fully consistent with the requirements specified in the Technical Regulations of the Customs Union 033/2013 "The safety of milk and dairy products" (Table 1)

Some of the data obtained in the process of work on the composition of the cheese are given in table 2.

In terms of dry matter, the mass fraction of fat was equal respectively to the variants 45.2%, 55.9 and 47.9%, with the content of the mass fraction of dry substances 52.7; 45.2; 50.3%.

The above data mainly meet the requirements of the GOST and, if desired, can be regulated by holding the normalization of milk.

As for the consistency of cheese (Q (kPa)), the cow's milk cheese turned out to be softer and more tender, unlike goat's milk cheese - 8.7 and 22.1 Q (kPa). Mixed milk cheese had an intermediate value - 14.4 Q (kPa).

In general, the cheeses of the above variants, obtained during laboratory development, comply with the requirements of brine cheese - brynza by its main indicators.

In assessing the main tasting indicators, such as taste and smell, texture and color of brynza from milk of cows, milk of goats and milk from a mixture, the total score was 18.40 \pm 0.53; 17.30 \pm 0.48 and 17.70 \pm 0.58 out of 20 possible. The difference between the first and second group is statistically significant (P > 0.01).

The scatter of the values for the participating tasters, judging by the coefficients of variation within 8.6% when evaluating cheese

from cow's milk, 15.2% from goat milk and 12.2% from milk mixture, indicates a significant diversity of opinions of the participants in the assessment, especially for cheese from goat's milk.

Thus, the use of goat's milk in its pure form makes a little worse the organoleptic characteristics of the cheese-brynza, but adding this milk to cow's milk improves these differences, especially taste and smell, which were respectively in groups of 9.0 \pm 0.35; 7.9 \pm 0.39 and 8.7 \pm 0.35 points.

In general, the goat's milk cheese and its mixture had a very attractive look, the optimal composition and received a positive assessment of the tasters.

Depending on the method of packaging in consumer packaging, cheese-brynza is divided into: cheese in vacuum pack, cheese in brine, cheese in marinade and cheese in oil. Furthermore, in the literature there is information about using the white dry grape wine as a filler.

The drinking water and salt with a concentration of 12% are used for the preparation of marinades and fillers. Calcium chloride is added to the brine. Mass fraction of the filler is not more than 1% by weight of the cheese. Per 100 kg of cheese - 50-100 kg of liquid. Filler or oil is pasteurized at a temperature of 75-85 ° C and poured hot in cheese cut into cubes and packed in consumer packaging. At three days of age, cheese is ready for sale.

As part of the experimental production of brynza-cheese from goat's milk and its mixture with cow's milk was made in a pouring like on figure below.

After three days, the cheese, obtained in a pouring of white dry grape wine and in a pouring of olive oil with the addition of canned olives and fresh bell pepper, were tasted.

According to the taste sensations, besides the specific for brynza taste and smel, cow's milk cheese (option 1) and goat's cheese (option 2) have gained additional tastes of filler with wine and olive oil with pepper and olives. The taste has become richer and fuller.

Thus, as noted above, the use of goat's milk in its pure form slightly lowers the organoleptic characteristics compared with the performance of cow's milk cheese.

But due to the use of filler and spices, these differences are completely eliminated, and according to a number of tasters, they give the goat's cheese a richer and more peculiar taste and flavor, improve the consistency.

The data on the organoleptic evaluation of cheese - brynza, made in the laboratory of the department of technology of meat and dairy products (Tables 3 and 4) are given below in confirmation.

The data in the table demonstrate the higher estimates of cheese from cow's milk compared with cheese from goat's milk (19.10 ± 0.25 and 17.95 ± 0.30), including for taste and smell, respectively, 9.45 ± 0.17 and 8.85 ± 0.19 points. There is also a difference in other estimates.

In assessing the organoleptic characteristics of cheese-brynza in the filler, the following data were obtained (table 4).

Goat milk's cheese in the filler got higher scores in all indicators than the similar cheese from cow milk (19.27 ± 0.16 and 18.87 ± 0.20), that demonstrate the positive effect of the filler based on olive oils with canned olives and Bulgarian pepper.

CONCLUSION.

Therefore, the results of the tasting assessment of the brynza, produced according to GOST R 53421-2009 "Brine cheeses" from milk of cows and goats, indicate an improvement in the taste and smell of goat cheese and the acquisition of original taste indicators

typical of brine cheese. In addition, as experiments have shown, developed cheeses can be packed in portion plastic packages with unconventional for brine cheeses fillers.

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