Problem № 4
«Making quark»

Team «12FM»

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The task

Quark, cottage cheese, and similar varieties of white acid-set cheese can be produced from milk.
Investigate this process experimentally and study the properties of the resulting product.

Hypothesis

If we make cottage cheese from milk, which has different quality parameters (fat content, processing method, etc.), the quality parameters of the finished product will vary.

Aim of the study

To determine the influence of quality parameters of milk on the properties of the resulting product which named cottage cheese.

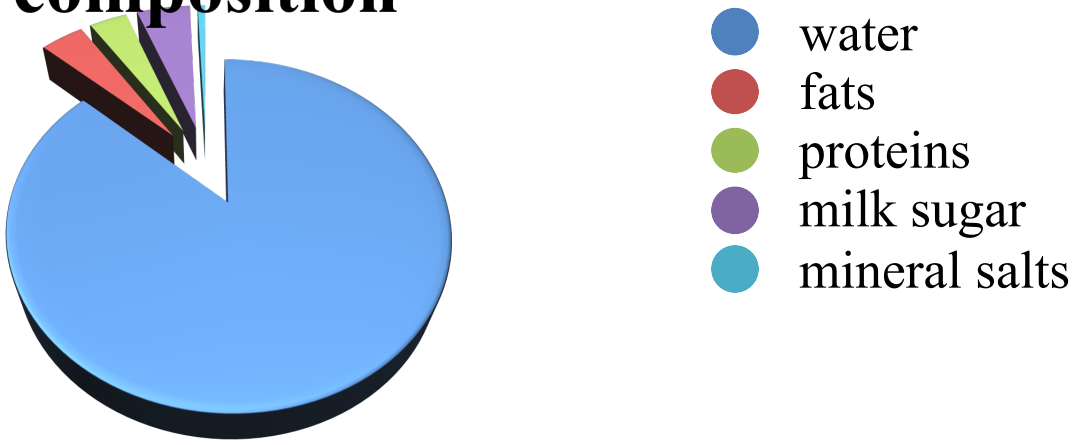
Tasks:

1.to consider the process of obtaining cottage cheese;
2.to study the properties of cottage cheese made from milk of different fat content;
3.to study the properties of cottage cheese made from milk of different processing methods;
4.to analyze the dependence of the properties of cottage cheese on the temperature of its production;
5.to determine the number of lactic acid bacteria in cheese of different fat content;
6.to study the effect of temperature on the formation of rennet cheese.

Theory

Cottage cheese is a fermented milk product obtained by fermentation of milk with subsequent removal of whey.

Milk composition



Milk

Natural milk
- Whole
- Normalized by fat
- Defatted.

Reconstituted

Classification by the type of heat treatment

Steam milk is immediately after milking, there are many different microbes and bacteria, we should drink it after two hours after milking.

Pasteurized milk is a milk, heated to 75 ° C, it does not spoil 2 weeks

Baked milk is a milk, subject to heat treatment at a temperature of 95 ° C for 3-4 hours.

Dry milk is a white powder produced by evaporating milk.

Sterilized milk is a milk, which was heated up to 145 ° C. All microbes and bacteria die, but the useful properties of milk decrease.

Ways of making cottage cheese

- Acid method;
- Acid-rennet method.

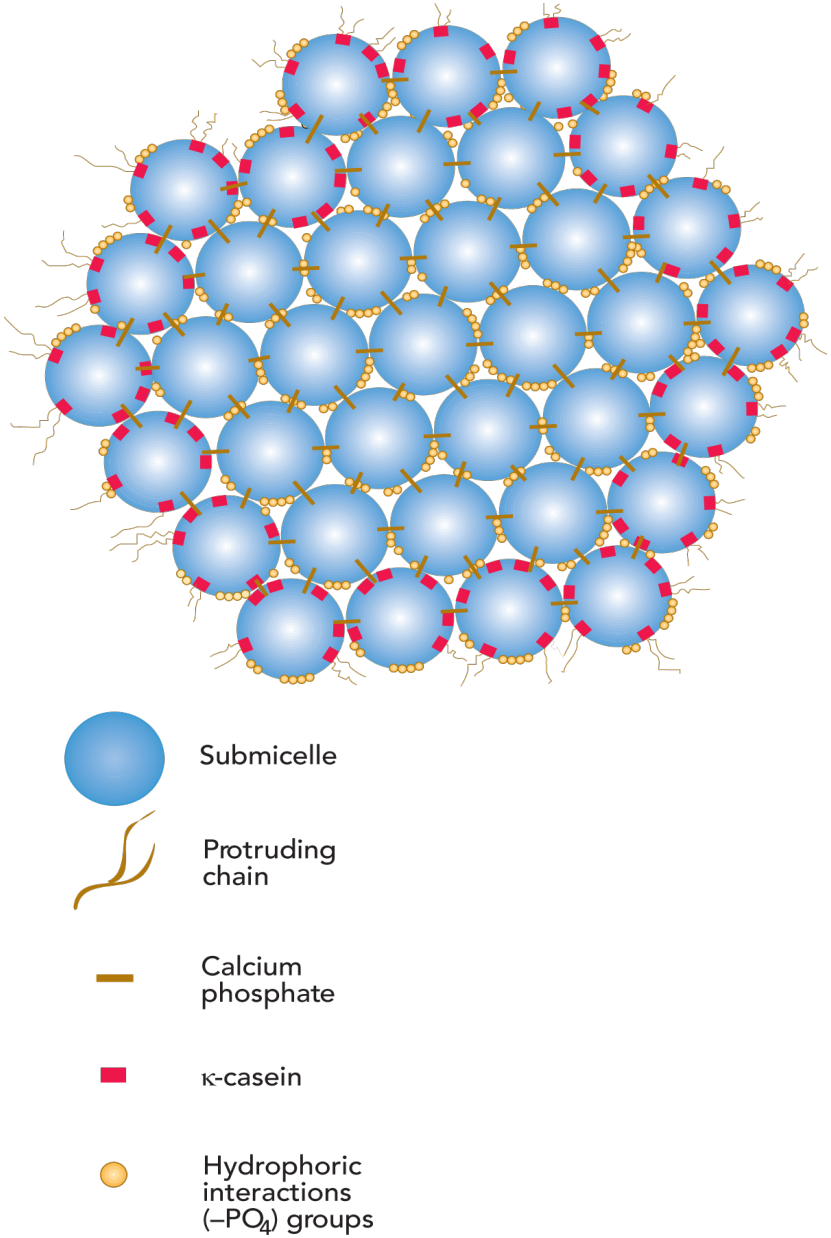
The production of cottage cheese

1) Hydrolysis of lactose

Lactose **Glucose** **Galactose**

2) Glucose fermentation

Protein. Structure of milk protein



The main milk protein is casein

Proteins are polymeric substances consisting of amino acid residues bound by peptide bonds.

Cottage cheese. How to cook it at home. Technologies

There's only one ingredient: homemade whole milk (2.5-10% fat content)

Time for preparation of classic cottage cheese from milk at home:
for making sour milk - about a day;
heat treatment - 25-30 min;
separating milk from whey - 2,5-3 hours.

Whey

Whey is a liquid by-product of cottage cheese preparation, which is formed after souring milk.

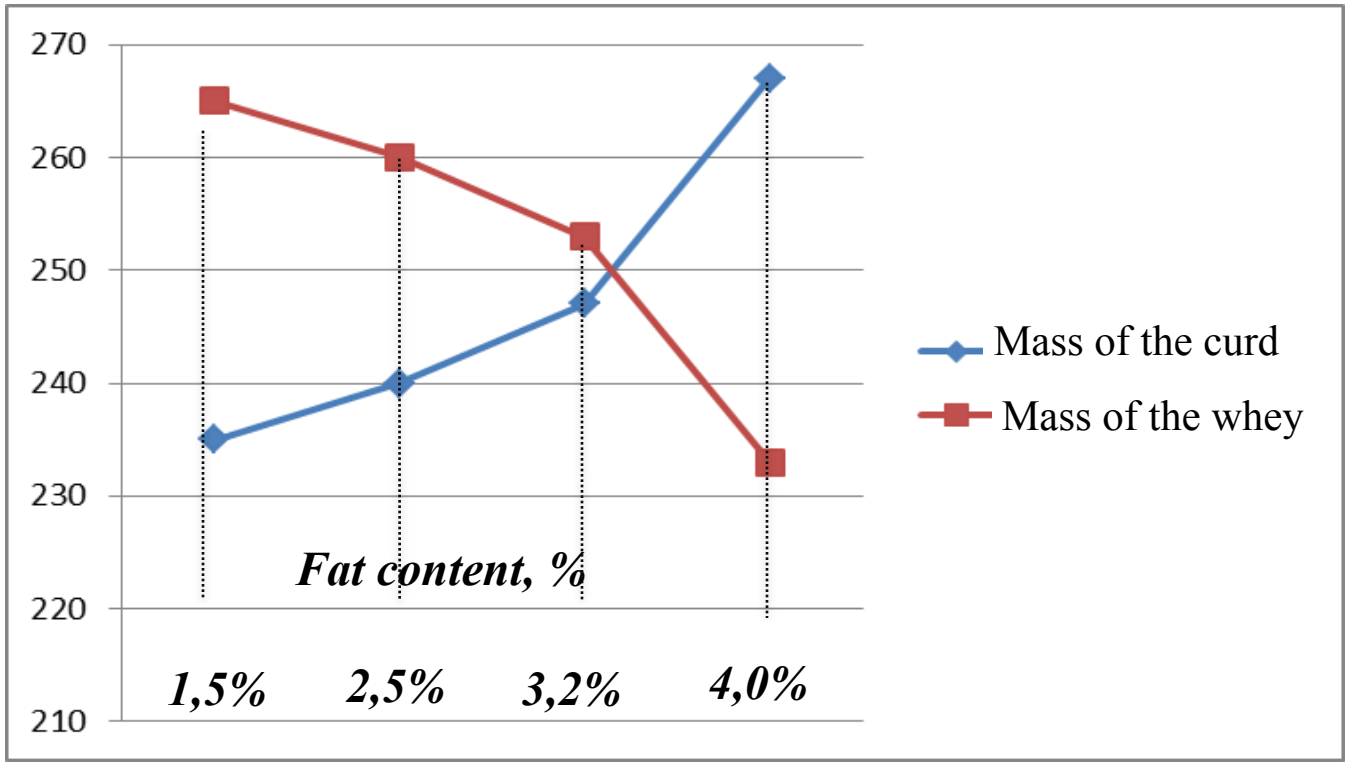
Organoleptic characteristics of cheese

Indicator name	Characteristics
Consistency and appearance	Soft, smearing or crumbly with or without detectable particles of milk protein.
Taste and smell	Clean, sour-milk, without foreign flavors and smells. For a product of reconstituted milk with a flavor of dry milk,
Colour	White or with a cream tint, uniform throughout the mass,

When fermentation process takes place under different conditions, the density, the sizes of the formed clots will be different

Experiment 1

Purpose: to establish the relationship between fat content of milk and mass of cottage cheese.



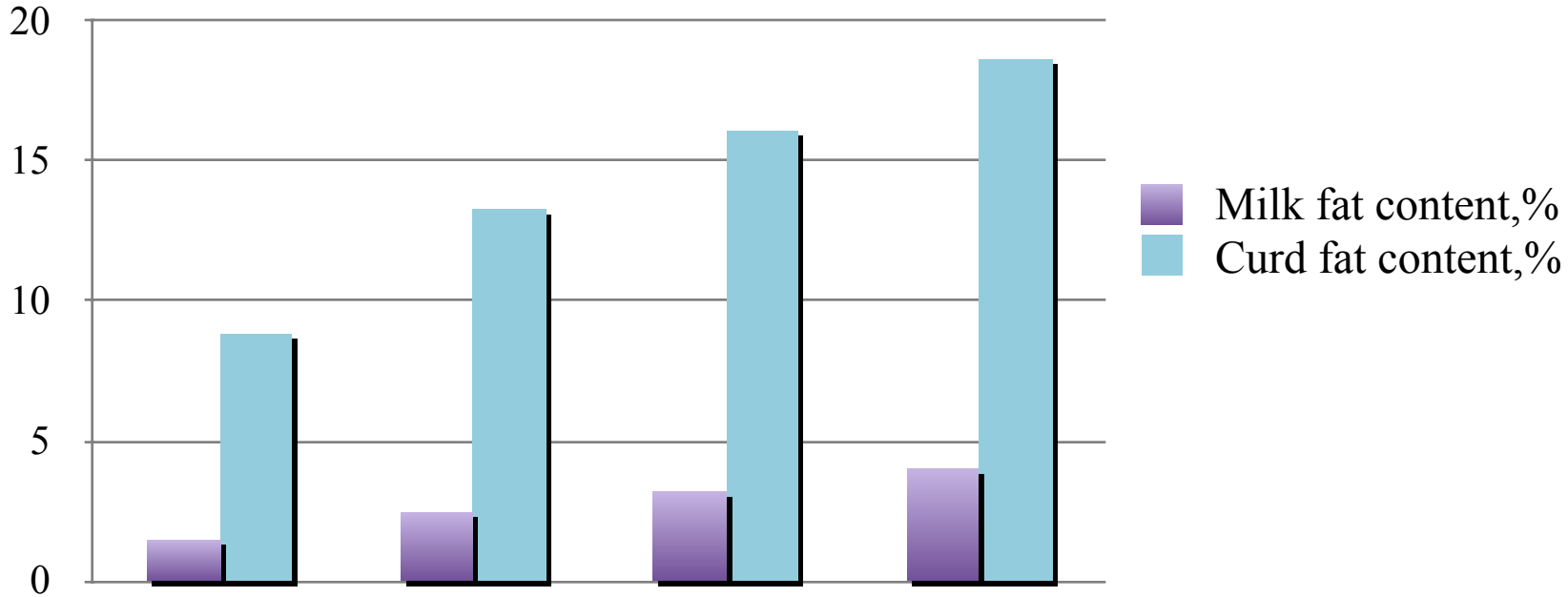
$$\rho = \frac{m}{V}$$

1)ρ-density, g / cm³
2)m-mass, g
3)volume, ml

Conclusion: If the fat content of milk increase, the weight of the finished product will increase too.

Experiment 2

Purpose: to determine the relationship between the fat content of raw materials and the fat content of the cheese.



$$N_2 = N_1 * A / B$$

N_1 – Milk fat content, %

N_2 – Curd fat content, %

A – mass of the milk, g

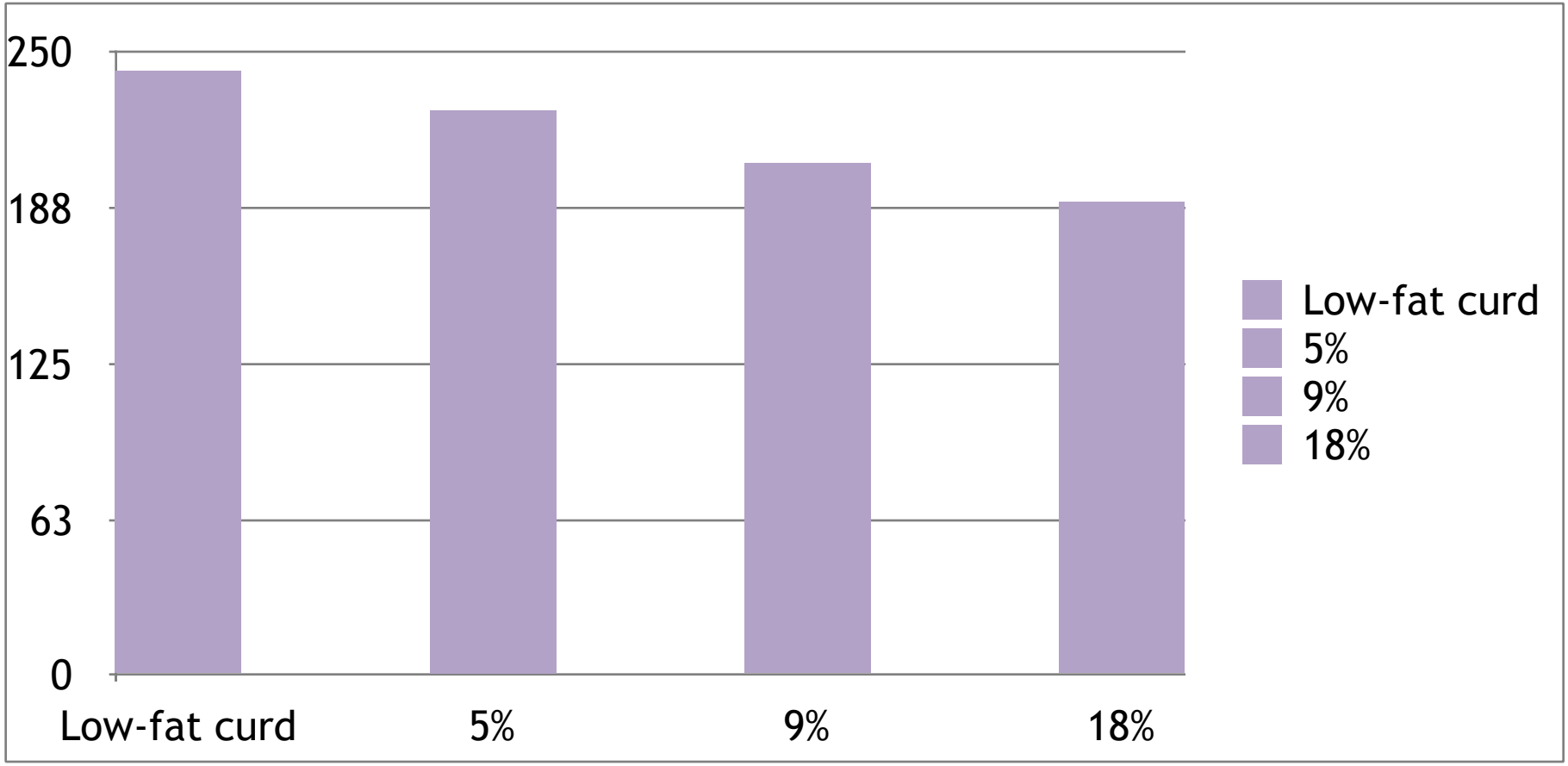
B – mass of the curd, g

$$\rho = \frac{m}{V}$$

1)ρ-density, g / cm³
2)m-mass, g
3)volume, ml

Experiment 3

Purpose: to determine the acidity of the cottage cheese depending on the fat content of the milk.



Conclusion: If the fat content of cottage cheese increases, its acidity decreases.

Experiment 4

Purpose: to compare curd, prepared from natural and reconstituted milk.

Indicator name	Characteristic for whole and normalized milk
Consistency and appearance	Crumbly without visible particles of milk protein.
Taste and smell	Clean, dairy-free, without foreign tastes and smells.
Colour	White color, uniform throughout the mass.

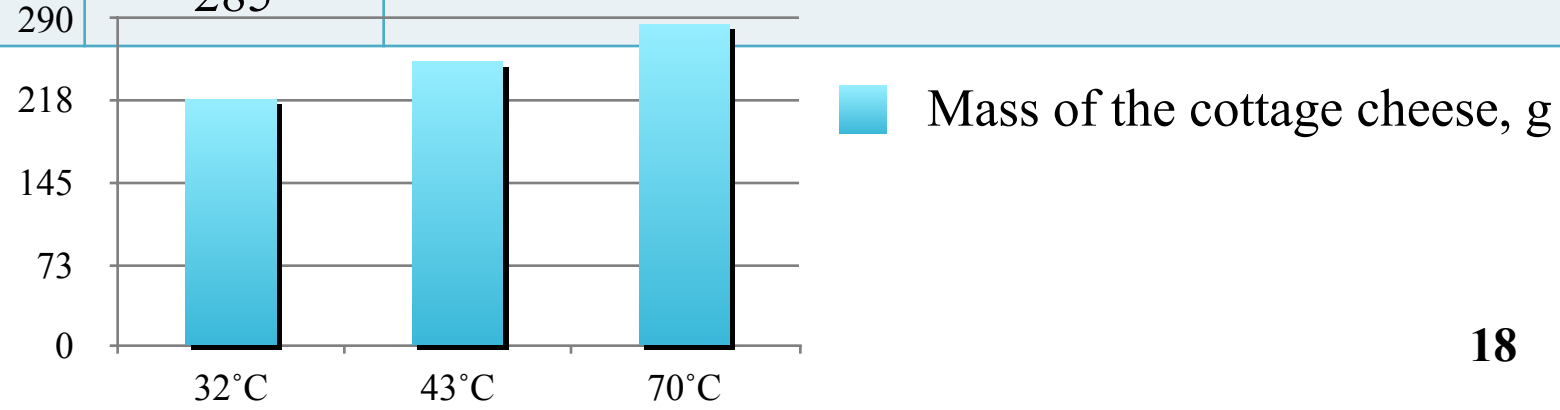
Indicator name	Characteristic for reconstituted milk
Consistency and appearance	The curd is not formed. On the surface there was mold.
Taste and smell	Acid smell.
Colour	The shades are uneven, with dark spots of mold.

Conclusion: Curd made from natural milk matches all standards. As for reconstituted milk, curd did not turn out.

Experiment 5

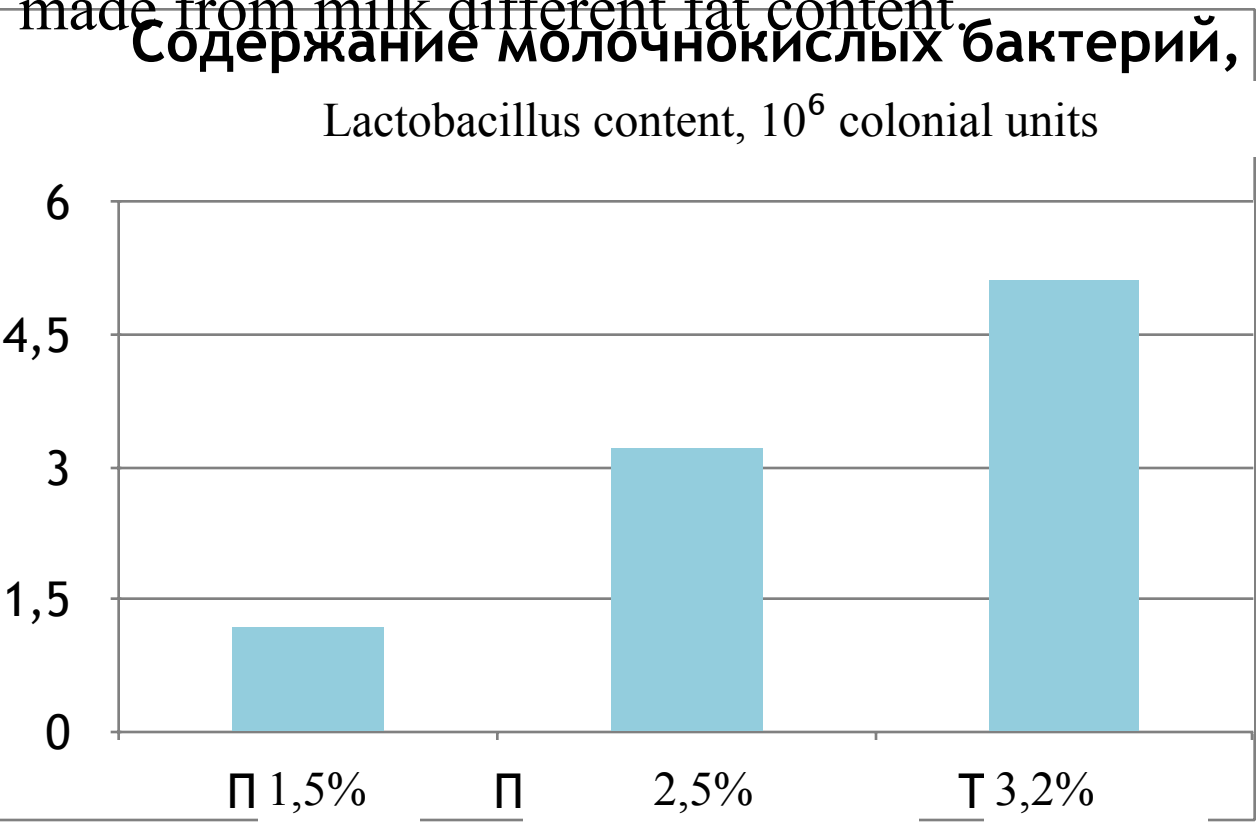
Purpose: to establish the dependence of some organoleptic characteristics and mass of cottage cheese from the temperature during the process of curd separation from whey.

The temperature	*Mass of cottage cheese, g*	*Organoleptic characteristics*
32^{0}C	219	Large clots. White color. Serum is poorly separated. Sour taste and smell.
43^{0}C	251	Clean fermented milk clots without foreign flavors and smells. Clots are white with cream tint.
70^{0}C	285	Small clots, dense, without expressed taste and smell.



Experiment 6

Purpose: to determine the amount of lactobacillus in the cottage cheese made from milk different fat content.



Conclusion: the content of bacteria in all samples corresponds to the standard but if the fat content increases, bacteria content will increase too.

Cheese. Kinds of cheeses

Cheese - is a food product made from milk using lactobacillus, enzymes and organic acids.

Cheese

Sour-milk

Rennet

Cream cheese

Experiment 7

Purpose: to investigate the influence of the temperature regime on the formation of rennet cheese.

Chechil cheese

34˚C

Camambert cheese

30˚C

+

Chechil cheese

39°C

Camambert cheese

36°C

Conclusion: the higher the temperature during the heat treatment of the cheese, the denser the will the cheese grain be.

Conclusions

The production of such dairy products as cheese and curd is based on the same processes – lactic fermentation and partial denaturation of protein. Cooking these products we should pay attention to such characteristics of raw material (milk) as fat content, type and degree of heat treatment. Also we should pay attention to the temperature during the heat treatment.

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