Lecture Four

Butter and Ice cream processing

(Theoretical part)

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Stage: Fourth stage (4)
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The taste of butter

Butter contains a high percentage of fat, and although free fat is not acceptable to taste, butter on the contrary, even if it contains only free fat (as in some continuous methods of butter making, the reason for that is the following:

1/ The composition of the butter is not (100)% fat but(80)%.

2/ Butter fat contains about (35) % of the fat granules that did not break down during the shaking process, and these granules Obscure the fat taste present in them due to the presence of the non-fat coating.

3/ Even if all the fat in the butter is free fat, the presence of water is distributed in the form of small fat droplets whose sizes are estimated in microns, so that each gram of butter contains a few billion of these drops, so that the feeling of the fat taste is reduced in this case, that is, the last characteristic has benefited the industry Butter Where it was found that the taste of butter resulting from one of the continuous methods is similar to the taste of butter resulting from the method of (shaking), including the granules present, prevent the fat taste.

The other thing is the presence of water, which is that the butter produced by one of the continuous methods is acceptable and similar to the butter produced through the shaking method

So the continuous method has become acceptable because the taste is good

The second benefit is in the production of margarine, which is made from vegetable fat (free fat), so the water drops are minimized, and spreading them in this fat reduces its unwanted taste or improves its taste / because the taste of free fat is not acceptable.

Butter making steps:

1 / to obtain cream (30-38%)

2 / Adjusting the acidity of the developed cream, if any.

3 / pasteurization

4 / Cooling after pasteurization either to:

a/ The chewing temperature is (8-15)° c, and this is in the case of sweet butter

b) The starting temperature is between (20-22)° C, in the case of a sour and flavored butter, then cooled to a temperature Shake.

c) The temperature of physical maturation, this case is followed when the desire to standardize the hardness of butter throughout the year, between cooling and heating.

And cooling the cream to make or balance between the liquid fat and the solid, and these degrees differ according to the season so that the characteristics of the resulting consistency are always constant or similar.

After completing this treatment, the cream is cooled to the shaking temperature

Notice:

The hardness and fluidity of the fat depends on the fatty acid, which is saturated or unsaturated. These are present in the milk and differ according to the different feeds.

5 / Add yellow dye

6 / Shaking produces butter

7 / Drain the Butter milk, which is called (Butter milk)

8/To get rid of more Butter milk, rinse with cold water

9 / Salting from (0-2%)

10 / Service and squeezing or operating

11 / Packaging and storage

1) Getting cream (30-38% fat)

Why (30-38) %?

You can shake cream less than (30) % and get butter, but the productivity of butter decreases and the shaking period may be prolonged.

As for the cream with a fat percentage of more than (38) %, if shaking it causes or gives whipped cream inside the churn, thus it proves its movement and is not subjected to the required shaking, so we are forced with water or milk

Note: Shake the yogurt gives a little butter

The process of obtaining the cream either by gravity method and it takes a day for pooping, so the process of separation takes place

Separating effects

A/ The high percentage of fat and the decrease in the resulting cream quantity compared to the original milk

Where is the effect of the screening process located? The mechanical action of sorting does not take place on the fat, but rather on the non-oily part, i.e. on the serum, where the centrifugation in the middle point removes the serum and the

cream remains in the middle and for this reason the fat comes out with a quantity of serum, so it is not fat but cream.

B / The Separating process: it reduces the amount of serum in the cream, and this leads to a decrease in the amount That is, the percentage of (SNF) in the cream is low as the percentage of cream fat increases, meaning SNF

4 fat	**96 serum**

The percentage of (SNF) in serum is 9%.

So in whole milk, which is 4% fat, you become

9 * (96/100) = 8.5٪

In cream serum

Cream 20%

4 Fat	**16 Serum**

16*0.09 = 1.44

C / The effect on acidity: Since the natural and advanced acidity causes are present in the serum (especially related to SNF) The restorative acidity decreases as the percentage of fat increases (that is, the lower the percentage). For this reason, we sometimes do not know the acidity of the developed cream unless we count it inside the serum.

Example:

Cream of 20% fat has a titratable acidity of 0.20%

Cream 4% fat with titratable acidityof 0.15%

The solution:

firm cream looks natural compared to milk

Serum acidity = cream acidity * 100 / serum percentage

The first case: 0.20 * 100 / (100-20) = (0.20 * 100)/80

= 0.20 * 1.25

= 0.25%

A second case: the acidity of the cream to 40% fat = 0.15 * 100 / (100-40)

= 0.15 * 100/60

= 0.25%

The visible and ultra violet region

Density difference, the higher the fat content, the lower the density

Fat% in the cream = 962 / the density of the cream -894

It should be noted in this law that if the fat percentage was 32, then the density of the cream = the density of water 1 g / cm3

These are considered acceptable + -2

2- The cream acidity equation: This is a low occurrence after the invention of the separator, because the speed of sorting does not allow the development of acidity compared to what happens by the gravity method, which requires a full day of sorting. The acidity builds up in it

If acidity develops, it can be modified.

3 / Pasteurization Can you make butter from unpasteurized cream?

The milk used to make butter does not have to be first class, for two reasons

1 / Butter is a fatty product, and the fat is the last to be affected in milk when acidity develops or spoilage.

2 / Most of the compounds that are destroyed are gone with the shaking milk, except that the butter itself is washed and the ingredients that affect its flavor or taste are removed.

The microbes must be eliminated, so it must be pasteurized, although milk is not first class

Pasteurization methods:

1- Slow pasteurization

63° c / hour

71° c / 30 minutes

The prolonged time is due to the decrease in the coefficient of thermal conductivity of the cream

2- Fast pasteurization method

92° c / 15 s or more

In this method, the efficiency of this process of pasteurization reveals the presence of the peroxidase enzyme, which must be tested negative.

3- Pasteurization with loosening of pressure is important in removing odors

Garibay in the cream with the use of heat at 75-80 ° C

It is not recommended to use this method because of the effect of the resulting butter lists

And to lose a lot of fat with vegetable milk

It is used only in the presence of clear, strange flavors, especially flavors of the forage

It is noticed that the pasteurization temperatures are higher than in milk, and the reason is due to the low coefficient of thermal conductivity.

And the poor quality milk is a carrier of a large number of bacteria that must be eliminated so as not to cause damage to the resulting butter

Eliminate them so as not to cause spoilage in the high temperature butter

Groups of hydrosulfur are released and these reduce lipid oxidation

4 / cooling the cream:

A / Cooling to 20-22 C for the purpose of adding a starter This treatment is useful when obtaining a butter with flavor and acidity. The starter used has two types of acidity.

A / Lactic acid bacteria ***Lacto coccus lactic*** **(L. lactic)**

B/ Flavored bacteria **As for** ***L. diaceti l***

Or ***Leuconostoc lactic*** **Or a mixture of them**

On this basis, the start of the butter either consists of 3 bacteria or 4, and each of them must be lactic acid bacteria, so if it contains lactic acid bacteria, then if it contains bacteria(L.diacetilactis)This type of prefix is denoted by the letter(D). Referring to diacetilactis) It is symbolized by a letter L If it contains bacteria (leuconostoc) and be(DL) If it contains them together, the best starters to use are DL Because it frees in its production of flavor compounds from the rest .

These starters are prepared commercially, either in powdered (dried) form or in frozen form, and either to be concentrated with bacteria (they were centrifuged to increase the number of bacteria in them) or in small numbers.

The concentrated type can be added to the cream directly without the need for activation, and in this case it is called the term (Direct –to-vat).

direct impregnation without the roller with activations

Because this is a large amount, concentrated by a large number

Non-concentrated species must be activated This does not mean that one or more of these initiator preparations cannot be preserved

The amount of starter used ranges from 1-10% calculated from the cream, and this percentage depends on the incubation period

If the cream is inoculated with 1% of the initiator, it is noticed that the

di acetyl compound, which is the most important flavoring compound, is formed 4 hours after the inoculation process and its production increases up to 12 hours, after which it begins to decrease in concentration due to its volatility and the absence of basic materials for the manufacture of the cream

(Basic compounds such as lactose, citric acid, or citrate)

Cream When the cream reaches the highest production of di acetyl, it corresponds to the pH (4.5-5) which is the pH in which the cream coagulates

What are the flavor compounds responsible for the flavor of the cream

The flavor is a mixture of taste and smell

1- Lactic acid, so it is involved.

2- A mixture between acetic acid, formic acid and probiotics, even if small quantities.

3- Diaceyl compound, which is the most important compound.

4- Alstaldehyde: This compound should be at its lowest levels because it is the compound responsible for the flavor of theYogurt and its presence in the butter is considered a defect and not an advantage, and if it is, it will be the flavor bacteria and after the completion of the maturation of the cream, , it must be cooled to the Optimum temperature of churning.

B - Cooling to the degree of temperature Agitato