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TECHNOLOGICAL PROCESSES DURING CHEESE PRODUCTION (ТЕХНОЛОГІЧНІ ПРОЦЕСИ ПІД ЧАС ВИРОБНИЦТВА СИРІВ)

Стокалюк Д. В*. – здобувач вищої освіти групи Т 4/1*

Науковий керівник - Саламатіна О. О. ,кандидат філологічних наук, доцент кафедри іноземних мов МНАУ

У статті йдеться про етапи виробництва сирів різних видів, технологічні особливості їх виробництва.

Ключові слова: *сорт, смакові якості, класифікація сирів, натуральний сир, технологічний сир, стандарт.*

The article deals with the stages of production of cheeses of different types, technological features of their production.

Key words: *variety, taste qualities, classification of cheeses, natural cheese, technological cheese, standard.*

Cheese comes in many varieties. The variety determines the ingredients, processing, and characteristics of the cheese. The composition of many cheeses is defined by Standards of Identity in the U.S. Code of Federal Regulations (CFR).

Cheese can be made using pasteurized or raw milk. Cheese made from raw milk imparts different flavors and texture characteristics to the finished cheese. For some cheese varieties, raw milk is given a mild heat treatment (below pasteurization) prior to cheese making to destroy some of the spoilage organisms and provide better conditions for the cheese cultures. Cheese made from raw milk must be aged for at least 60 days, as defined in the CFR, section 7 CFR 58.439, to reduce the possibility of exposure to disease causing microorganisms (pathogens) that may be present in the milk. For some varieties cheese must be aged longer than 60 days [2].

Cheese can be broadly categorized as acid or rennet cheese, and natural or process cheeses. Acid cheeses are made by adding acid to the milk to cause the proteins to coagulate. Fresh cheeses, such as cream cheese or queso fresco, are made by direct acidification. Most types of cheese, such as cheddar or Swiss, use rennet (an enzyme) in addition to the starter cultures to coagulate the milk. The term “natural cheese” is an industry term referring to cheese that is made directly from milk. Process cheese is made using natural cheese plus other ingredients that are cooked together to change the textural and/or melting properties and increase shelf life [1].

The classification shown in Table 1. applies to all cheeses covered by this standard. However, this classification shall not preclude the designation of more specific requirements in individual cheese standards.

Table 1. A

Classification of cheese

If the MFFB* is, %	**Term I The 1st phrase in the designation shall be**	**If the FDS** is, %**	**Term II The 2nd phrase in the designation shall be**	**Term III Designation according to principal curing characteristics**
< 41	Extra hard	> 60	High fat	1. Cured or ripened
49 – 56	Hard	45 – 60	Full fat	a. mainly surface
54 – 63	Semi-hard	25 – 45	Medium fat	b. mainly interior
61 – 69	Semi-soft	10 – 25	Low fat	2. Mould cured or ripened
> 67	Soft	< 10	Skim	a. mainly surface
				b. mainly interior
				3. Uncured or unripened***

Table 1. B

Type	**Origin**	**FDB**	**MFFB**	**Term 1**
Parmesan	I	35+	≈ 40 %	Extra hard
Grana	I	35+	≈ 41 %	Extra hard
Emmenthal	CH	45+	≈ 52 %	Hard

Gruyère	F	45+	≈ 52.5 %	Hard
Cheddar	UK	50+	≈ 55 %	Hard/Semi-hard
Gouda	NL	45+	≈ 57 %	Semi-hard
Tilsiter	D	45+	≈ 57 %	Semi-hard
Havarti	DK	45+	≈ 59 %	Semi-hard
Blue cheese	DK, F, S etc.	50+	≈ 61 %	Semi-hard/ Semi-soft
Brie	F	45+	≈ 68 %	Semi-soft
Cottage cheese	USA	>10	< 69 %	Soft

Cheesemaking involves a number of main stages that are common to most types of cheese. There are also other modes of treatment that are specific to certain varieties. The main stages for production of hard and semi-hard cheese are illustrated schematically on the block chart in Figure 1. The cheese milk is pre-treated, possibly pre-ripened after addition of a bacteria culture appropriate to the type of cheese, and mixed with rennet. The enzyme activity of the rennet causes the milk to coagulate into a solid gel known as coagulum. This is cut with special cutting tools into small cubes of the desired size – primarily to facilitate expulsion of whey. During the rest of the curdmaking process, the bacteria grow and multiply and form lactic acid from the lactose. The curd grains are subjected to mechanical treatment with stirring tools, while at the same time the curd is heated, according to a pre-set programme. The combined effect of these three actions – growth of bacteria, mechanical treatment and heat treatment – results in syneresis, i.e. expulsion of whey from the curd grains. The finished curd is placed in cheese moulds, mostly made of plastic, which determine the shape and size of the finished cheese.

The cheese is pressed, either by its own weight or more commonly by applying pressure to the moulds. Treatment during curdmaking, pressing, brining and storage conditions determines the characteristics of the cheese. The process flow chart in Figure 1. also shows salting and storage. Finally, the cheese is coated, wrapped or packed [3].

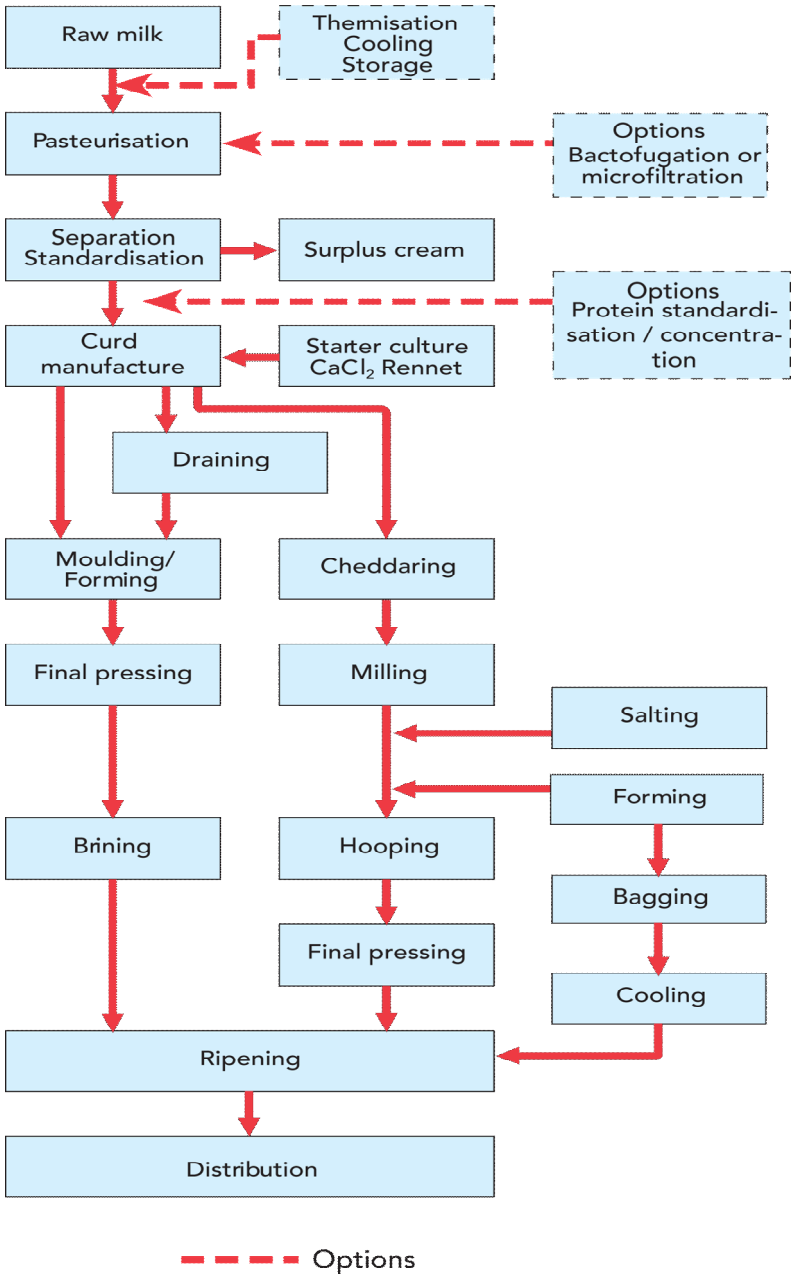

Figure 1

Process flow in production of hard and semi-hard cheese.

The PasLite test is an internationally accepted method used by dairies and food manufacturers to verify pasteurization for many types of dairy products. The PasLite test verifies the completeness of milk pasteurization by detecting alkaline phosphatase, a natural enzyme in milk that is destroyed by the heat and hold time of pasteurization. The test takes 3 min and multiple samples can be run simultaneously, however only one sample can be read at a time.

When a dairy sample is mixed with PasLite reagents and incubated, the resulting solution emits light in an amount directly proportional to the phosphatase enzyme present. The Charm nova LUM ATP detection system is used to measure the light emitted and coverts light readings to

enzyme units. Phosphatase readings greater than 350 mU/L indicate product pasteurization issues, according to US and EU pasteurization requirements. The PasLite test detection limit for liquid dairy products is 20 milliunits per liter (mU/L) phosphatase (~0.002% raw milk). This is much lower than the 350 mU/L level (0.1% raw milk) mandated by nearly all public health agencies [4].

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PUMISELECT CLONAL ROOTSTOCK

Тарабанов Р.В – *здобувач вищої освіти групи А1/2*

Науковий керівник - Ганніченко Т.А., кандидат педагогічних наук, доцент кафедри іноземних мов МНАУ.

Щеплення є одним із головних агротехнічних прийомів у садівництві. Саме за допомогою нього ми отримуємо якісний посадковий матеріал. Та якщо прищепа практично не впливає на компактність крони, то від «підщепи» залежить те, наскільки рослим буде дерево, тож треба досить серйозно підійти до вибору підщепи. У статті досліджено щеплення на даний момент найперспективнішою підщепою для кісточкових культур «Пуміселект».

Ключові слова: *щеплення, крона, підщепа, пуміселект.*

Grafting is one of the main agricultural techniques in horticulture. It is with his help that we get quality planting material. But if the rootstock has almost no effect on the compactness of the