

Feta Cheese:

Agricultural processing brochure

South African farmers facing current economic realities are searching for new options to maintain or expand their businesses. One of the many opportunities to grow markets, turnover and profits is by adding value to farm produce. Options need to be selected carefully based on sound information and knowledge of the opportunities presenting themselves taking into account the strengths and weaknesses of individual farms.



Introduction:

Product group: Dairy products

Dairy milk is one of the most versatile products available to the processor. Processing options include fermenting, concentrating, drying, freezing and many more methods of preservation. Processed dairy products are divided into five groups:

- Concentrated dairy products
- Cultured dairy products
- Frozen dairy products
- Liquid dairy products
- Powdered dairy products



Feta is a *pickled cheese* with a clean, acidic, salty taste.



Product description: Feta

Feta cheese is categorised as a cultured dairy product. Feta is a *pickled cheese* with a clean, acidic, salty taste. It is packaged in a brine solution to prevent drying out and to preserve the cheese. Feta is a *semi-hard cheese* with a minimum fat in dry matter content of 45% and a maximum dry matter content of 60% and a minimum dry matter content of 40%.

Feta may contain added ingredients such as black pepper, chives and various other herbs and seasonings.

Storage of raw milk for processing

The common denominator of dairy product is milk which is a highly perishable product that may turn sour if left at room temperature. Milk must be cooled

to improve its quality and stability. Milk leaves the cow at $\pm 37^{\circ}\text{C}$ and must be cooled within 3 hours to 4°C . During cold storage, the milk must be stirred gently to prevent a cream layer from forming on top (cream separation by gravity). Raw milk is thus kept in large tanks at the factory or processing plant fitted with one or more propeller agitator(s) until further processing proceeds.

Milk preparation for the manufacturing of cheese

Clarification of milk

Clarification is the removal of solid impurities (dirt particles, white blood cells and cells of udder tissue) from the milk, prior to further processing. Clarification is achieved through filtration.

Thermisation of milk (optional)

Thermisation is a sub-pasteurisation heat treatment used to treat raw milk when it arrives at a dairy or processing plant if it cannot be processed immediately. The milk is heated to 60 - 66°C for 5 - 20 seconds in a plate heat exchanger. This heat treatment with the result that milk can be held at 4°C for 2 - 4 days without any significant spoilage organisms growing.

Pre-heating of milk for separation

Prior to separation the milk is heated to 45 - 60°C to ensure effective separation of the skim milk and cream phase. Heating also inactivates the enzyme lipase that is responsible for the development of rancidity in fats. Pre-heating guarantees the highest possible cream quality, i.e. the lowest amount of free fat in skim milk.



Fast facts:

Fresh milk should be cooled to: **4 °C**

Prior to separation the milk is heated to: **45 - 60 °C**

Separation and standardisation of milk for cheese

Separation: The cream fraction of raw milk is separated from the skim milk by passing pre-heated raw milk (45 – 60°C) through a conventional or hermetic centrifugal separator.

Standardisation follows directly after separation and involves adjusting the fat content of milk to obtain a product with a defined, guaranteed fat content. Cheese is mostly classified according to its fat on dry basis.

The **dry matter** in **cheese** contains proteins, butterfat, minerals, and lactose (milk sugar), although little lactose survives fermentation when the cheese is made. A cheese's fat content is expressed as the percentage of fat in the **cheese's dry matter**, which excludes the cheese's water content.

Homogenisation of milk for cheese (optional)

Homogenisation is the process where the fat globules in the milk are finely distributed to prevent fat separation. Homogenisation is accomplished by forcing the

milk through a small opening at high velocity to cause disruption of the large fat globules to form small, stable fractions. Homogenisation is most effective when the milk is slightly heated (60 - 70°C) and can be done partially or completely.

Feta cheese process

1. Pasteurising the milk:

Pasteurisation is a mild heat treatment that destroys all vegetative pathogens and heat sensitive enzymes so that the phosphatase test gives a negative result.

The milk is heated to 72°C, followed by rapid cooling. Although cheese made from unpasteurised milk is considered to have a better flavour and aroma, cheese milk is pasteurised to eliminate microbial competition for the starter culture and to prevent some common defects during ripening. Various pasteurisation methods are available, depending on the size of the processing plant.



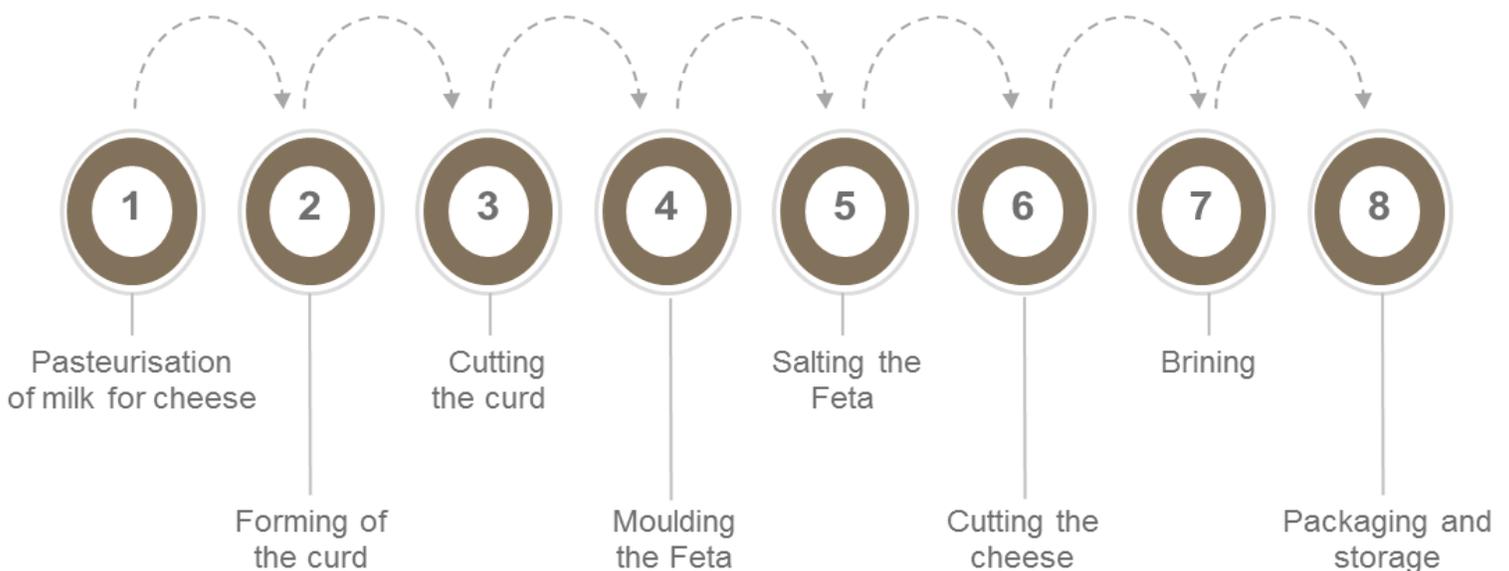
2. Forming the curd:

- Bacterial culture is added to the milk in the vat at 29 °C to acidify the milk. The bacterial culture introduces 'good' bacteria, which plays an important role throughout the process. The temperature creates ideal conditions for the bacteria to grow, and the acidic environment helps prevent foreign bacterial contamination.
- Rennet is added to the milk when it reaches a certain pH. This causes casein protein in the milk to coagulate and separate from the liquid whey.

3. Cutting the curd for Feta: The product is divided into smaller parts, resulting in a larger surface area to aid further processing. Vertical and horizontal knives are used to cut the coagulum into small cubes (6 - 30 mm) to ease the whey separation (syneresis) by increasing the exposed areas. The cubes of curd and whey are gently stirred to prevent lump formation.

4. Moulding of Feta: The curd particles are taken from the whey and lightly compressed into moulds or metal hoops (\pm 20 cm deep) and left for 1 hour to fuse and take on the shape of the mould. The moulded curd is stored at 16 - 18 °C.

Process overview



If seasoning and herbs are to be added to the cheese, it is done before moulding, by mixing the ingredients with the curds. All added ingredients should be pasteurised, irradiated or otherwise preserved.

5. Salting of Feta cheese: Once the curd has taken on the shape of the mould, the surface of the curd is lightly salted and turned upside down, salted again on the other side and left for a further 20 hours. During this time the cured particles fuse while absorbing some of the salt.

6. Cutting of Feta cheese: The product is divided into smaller parts, resulting in a larger surface area to aid further processing. The salted cheese is cut into different sized pieces and placed in barrels in layers. Dry salt (3% in total) is added over a period of 2 - 3 days.

7. Brining of Feta cheese: The barrels are topped up with a 5% brine solution and left for 12 - 18 days, before being stored under refrigerated conditions.

8. Packaging of Feta cheese:

Packaging is defined as the containment of a food product in a protective barrier that prepares goods for transport, distribution, storage, retailing and end-use.

Plastic tubs are mostly used to package Feta cheese. The cut pieces are placed in the retail containers along with a brine solution, sealed and stored under refrigerated conditions.



Fast facts:	Brining of Feta cheese:	Brine solution	Left for days:
		5 %	12 - 18

<p>Labelling of cheese</p> <p>All the feta cheese containers are pre-labelled or labelled after they are filled and sealed.</p> <p>Labelling in South Africa is controlled by legislation. Anyone who wants to use the information provided in this document must familiarise him/herself with all the applicable laws that apply to the producing, processing, manufacturing and storage of the products referred to in this document.</p> <p>Please also refer to the disclaimer on the last page.</p>	<p>Other processing options – Cultured dairy products</p> <p>Listed below are other processing options not covered in this report, but available from Eskom.</p> <ul style="list-style-type: none"> Cheddar cheese is defined as the product obtained from coagulated milk from which the whey has been removed. The coagulum or curd has undergone ripening to a greater or lesser extent. Cheddar is classified as a high fat, hard cheese. 	<ul style="list-style-type: none"> Cheese spread is a blend of hard cheese with added emulsifying salts. The mixture undergoes a heat treatment that increases the shelf life. Cheese spread has a relatively high moisture content ($\pm 55\%$) and a pH of 5,7 - 6,3. Cultured (sour) cream is the product obtained from cream that has been inoculated with a starter culture to allow for the development of lactic acid and flavour compounds under controlled conditions
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- **Cultured buttermilk** is the product obtained from milk that has been inoculated with a starter culture to produce a viscous liquid with a mild lactic flavour. It is consumed as a refreshing drink or used as an ingredient in various baked products.
- **Drinking yoghurt** is essentially stirred yoghurt with a lower solids content and broken coagulum. It may be pasteurised and/or aseptically packaged to extend the keeping quality.
- **Kefir** is a smooth, viscous, fermented dairy drink with a fresh acidic taste and contains lactic acid, alcohol ($\pm 1\%$) and gas (carbon dioxide).
- **Long life, set dessert** is a cultured dairy product similar to yoghurt that has undergone a heat process to extend the keeping quality. Set long life dessert is fermented in the final retail container and has a gel-like consistency. It may or may not be flavoured.
- **Long life, stirred dessert** is a cultured dairy product similar to yoghurt that has undergone a heat treatment to extend the keeping quality. Stirred long life dessert is produced in large batches prior to packaging in the final retail container.
- **Maas (cultured milk)** is manufactured by inoculating pasteurised milk with a specific bacterial culture. The end product has a firm texture, no gas bubbles and no separation of whey from the coagulum. It has pleasant sour taste with a slight bite/prickliness on the tongue.
- **Processed cheese** is made from a variety of natural cheeses that are ground and blended together with emulsifying agents. Various other additives may also be added. The mixture is heated and packaging in laminated films.
- **Ricotta** is a cheese prepared from whey. Ricotta is a low fat, soft cheese with a maximum fat in dry matter content of 10% and a minimum dry matter of 20%.
- **Set yoghurt** is prepared from high or full fat pasteurised milk inoculated with a specific starter culture. Fermentation takes place in the final retail container under controlled conditions. The yoghurt has a firm, gel-like consistency and a clean surface is apparent when the yoghurt is cut.
- **Stirred yoghurt** is a fermented milk product with a thick, smooth consistency and may or may not be flavoured. It is incubated in tanks, stirred, flavoured and cooled before packaging.
- **Cottage cheese** is the product obtained from coagulating milk. It is a soft, not matured cheese and contains about 80% moisture.
- **Gouda** is a close textured, mild cheese. It is classified as semi-hard.



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Literature sources

- Catsberg, C.M.E. & Kempen van Dommelen, G.J.M. 1990. Food Handbook. New York: Ellis Horwood.
- Dairy Processing Handbook. 1995. Tetra Pak Processing Systems. Sweden. Early, R. 1992. The Technology of Dairy Products. London: Blackie.
- Fellows, P. 1988. Food Processing Technology: Principles and Practice. Chichester: Ellis Horwood, Ltd.
- Lombard, S.H. 1975. Kaasvervaardiging. South African Journal of Dairy Technology, Vol. 7, No. 3, pp. 163 - 166.
- Robinson, R.K. 1994. Modern Dairy Technology. Vol 2. Advances in Milk Products. 2nd ed. London: Chapman & Hall.
- Rosenthal, I. 1991. Milk and dairy products: properties and processing. Basel : VCH.
- South Africa - Agricultural Products Standards Act (No 119 of 1990) and regulations Pretoria Government Printers
- South African - Foodstuffs, Cosmetics and Disinfectant Act (no 54 of 1972) and regulations. Johannesburg: Lex Patria
- Varnan, A .H. & Sutherland, J.P. 1994. Milk and Milk Products: Technology, chemistry and microbiology. London: Chapman & Hall.
- Google free images: Product and other photos were sourced from Google images using a filter: Free to share and use commercially
- Science learning hub - <https://www.sciencelearn.org.nz/resources/828-manufacturing-gouda-cheese>



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The aim of this document is solely to provide the reader with some basic information on agro processing in order to understand the extent of the operations involved.



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