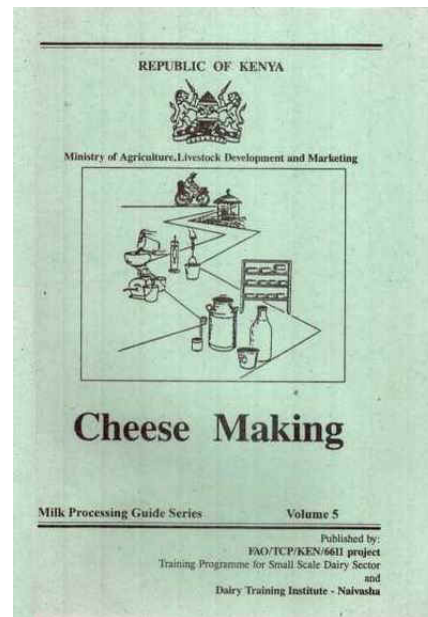


# Cheese Making



## Milk Processing Guide Series Volume 5

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**Training Programme for Small Scale Dairy Sector and Dairy Training  
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## **1. INTRODUCTION**

***In general, proper milling procedures and hygiene are followed by most dairy farmers in Kenya. However some facts indicate that, there is still room and need for improvements. For example, dairy plants still reject a substantial amount of the milk delivered for processing. During 1994, out of 45,729,953 kg milk delivered at KCC, Nakuru plant, 375,966 kg (8.2%) of milk was rejected. Most of the rejected milk was due to advanced acidification when it reaches the dairy plants after long periods of transport without prior cooling. Projected on a national scale, milk rejections of the order of 8% could amount to millions of milk and shillings lost by the dairy farmers.***

***One way of reducing such losses, is to convert the perishable raw milk into preserved, long keeping products such as cheese in small to medium scale dairies near to the farmers located in remote, inaccessible areas.***

***Since the liberalisation of the dairy industry in Kenya in 1992, a number of small scale to medium scale dairy processing plants have emerged. Apart from processing liquid milk and cultured milk products, some of these plants are also producing a variety of cheeses. The quality of cheeses produced, vary from being of very high quality to some which are of below average quality or poor quality - especially in small scale establishments. In order to assist the small scale to medium scale processors improve the quality of their dairy products including cheese, the Training Programme for the Small Scale Dairy Sector under project GOK/FAO/TCP/KEN/6611, has prepared this guide as Cheese Making to be used for training and by the private small scale dairy processors. The emphasis is on hygienic milk production method and a good understanding of cheese processing principles and good manufacturing practices, which is essential for successful production of good quality cheese.***

## **2. CHEESE MAKING**

### **2.1 What is Cheese?**

***Most likely you will have experienced that once you tried to boil***

***milk that was slightly sour to the taste. The result: the milk coagulated forcing the whey to separate from the curd. You probably did throw away the lot as "spoilt milk".***

***If on the other hand, you had taken a "little trouble" and filtered the curd through a piece of clean, loosely knit white cloth (cheese cloth) or a sieve, the trapped curd is indeed "fresh cheese". With a little salt added, the fresh cheese tastes real nice.***

***The fresh (curd) cheese, will like all fresh or raw foods spoil within a short time if not well preserved. To preserve the cheese, the fresh curd is often pressed to form a compact mass, salted and stored under special care to "ripen" through a kind of fermentation for 4 to 8 weeks or more. This changes the body of the whitish creamy cheese card to a soft, mellow, yellowish coloured cheese body containing nutritious milk proteins, fat, vitamins and minerals. This manual intro duces you to the art of making of a few types of ripened cheese.***

## ***2.2 How many types of cheese?***

***Broadly speaking there are two main types of cheese.***

***i) Those which are made through coagulation of milk by acidification.***

***The acidification can be by direct addition of an organic acid such as lemon juice or vinegar OR by "natural acidification" through acid***

***produced by milk lactic acid bacteria. Most of such type of cheese is consumed "fresh" or "soft", unpressed cheese.***

***ii) Cheese in which the milk is coagulated by means of enzymes (rennet).***

***The second type and the most common, is that in which the milk is coagulated by means of enzymes extracted from the stomach of young calves or other sources.***

***Most of this type of cheese is often pressed into various shapes, salted and ripened into "semi-hard" or "hard types". As with other types of foodstuffs, a variety of "preparation" recipes have resulted into thousands of types of ripened cheeses worldwide. Each type is best suited for the conditions under which it has evolved. In Kenya, experience has shown that Feta cheese, Pasta Filata cheese and semi-hard, Alpine types of cheeses (Gruyere, Gouda, Tilsiter etc.) can be made under farm or small scale processing installations. The manufacture of these three types will be described in detail in this Processing Guide.***

### ***2.3 Why, Where and When to make Cheese***

***In many parts of Kenya, some large-scale dairy farmers, produce and process milk on their farms into cheese. There is opportunity for small scale to medium scale milk processors to tap milk from remote milk shed areas and process it into cheese of their choice.***



***For smallholder dairy co-operative societies, marketing milk as raw milk may not be the best option in terms of potential economic returns. Under appropriate conditions, which must be considered carefully, cheese making could earn them higher returns from their milk if they choose to process it into cheese.***

***Other factors to consider include the fact that, very often women have to walk long distances to the market place to sell several litres of milk everyday. Women can form co-operative groups to collectively market their milk. If 100 litres or more can be collected, this is a very heavy load-to be transported. 13 kg is milk solids with useful nutrients. The rest, 87 kg is water.***

***Through cheese production, the 100 kg of milk is concentrated to about 10 kg, well preserved cheese requiring to be taken to the market only once a week. The rest of the milk whey can be fed to pigs or used in the preparation of "ugali" or "uji" instead of using tap water.***

***Therefore, where a market for cheese exists good cheese making provides a means of improving:***

***Marketability of milk surpluses.***

***Preservation of valuable milk solids.***

***Women's workload in milk marketing.***

## ***Farm income from dairy production.***

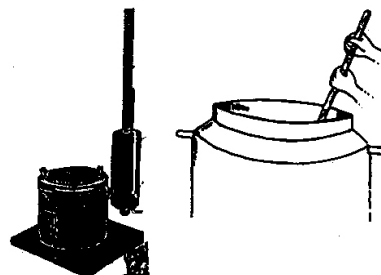
### ***3. HOW TO MAKE "PASTA FILATA" CHEESE***

#### ***3.1 Materials and equipment***

***To be able to make a "Pasta Filata" type of cheese at the farmhouse or village level you will require the following:***

- a) Milk: from at least 100 litres to as much as 2000 litres or more.***
- b) Rennet: in powder form or as tablets or a local rennet substitute (e.g. crude extract from goat kid or calf abomasa) may be used.***
- c) Charcoal stove or biogas burner for warming/heating the milk.***

***Where resources permit, an electrical hot water generator or water boiler or tunnel hot water boiler may be used.***

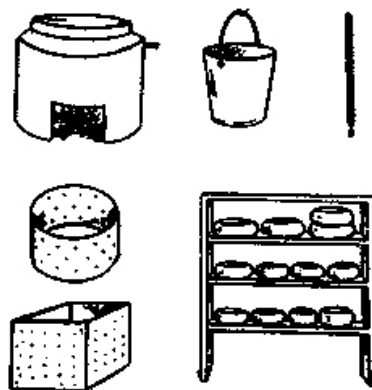


***Fig. 3.1: Improved "jiko" may be used in pasteurising cheese milk in***

***e) Various utensils such as: cheese vats, cheese buckets, cheese knives, thermometer, colander, wash basins and running water, cups, ladles, sufurias etc.***

***f) Cheese moulds; select either cylindrical or round.***

***g. Cheese curing room with wooden shelves or small cupboard.***



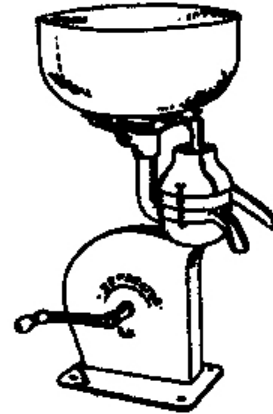
***Fig. 3.2: Some equipment required in cheese making.***

### ***3.2 Manufacturing steps***

#### ***3.2.1. Milk standardization***

***Although whole milk may be used, it is recommended to use milk of***

**3% butterfat in making "Pasta Filata" cheese, This is achieved by separating part of the milk in a cream separator to remove cream. The resulting skim milk is then mixed with the rest of the milk to give cheese milk of about 3% BF.**



**Fig. 3.3 A hand driven cream separator.**

### **3.2.2. Heating the cheese milk**

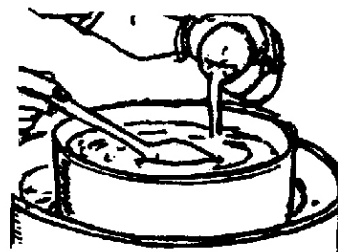
**After standardising the milk, it is put in a large container called a "cheese vat". The milk is heated by hot water surrounding the cheese vat. For small amounts of milk, water in a large aluminium sufuria (40 litres) may be used to heat milk placed in a small sufuria (20 lines). The water may be heated using a charcoal stove or biogas burner. The milk is heated to 35°C only.**



**Fig. 3.4 : Heating of cheese milk to 32 - 35°C.**

### **3.2.3 Starter culture addition**

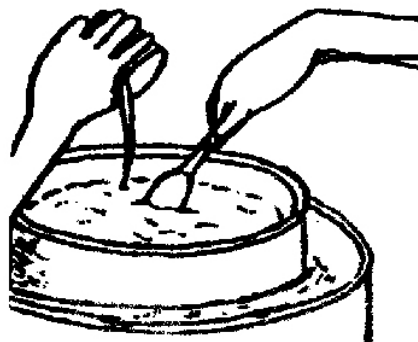
**The next step is to add previously fermented lactic acid culture or sour milk at the rate of 1.5 to 2 litres per 100 litres of milk (0.3-0.4 litres per 20 litres cheese milk). Stir for 5 min. Leave undisturbed for 15 min.**



**Fig. 3.5 Addition of starter culture to the cheese milk. Stir well for 5 minutes.**

### **3.2.4 Addition of rennet**

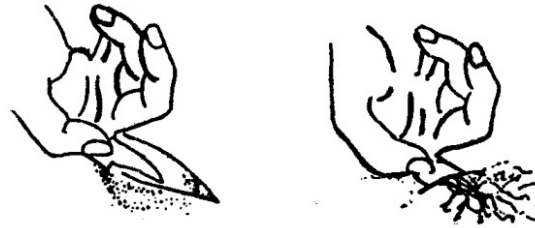
***While the milk is being let to ripen for 15 min., dissolve one tablet or rennet powder in a glass of clean water. Add a pinch of salt to the rennet solution. After ripening period, add the rennet solution to the cheese milk and stir (maintain a temperature of 35 C). Leave undisturbed.***



***Fig. 3.6 Adding and stirring-in rennet.***

### **3.2.5 Testing curd firmness**

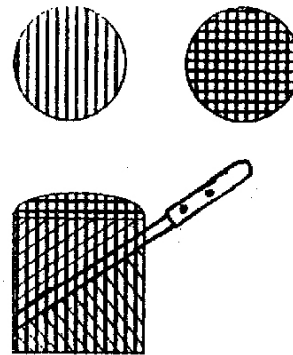
***Stab the coagulum with the forefinger and lift. If it breaks clean, the curd is ready for cutting. If it shatters, give it a little more time, then try again.***



**Fig. 3.7: A firm curd breaks smoothly (left) without shattering (right).**

### **3.2.6. Cutting the curd**

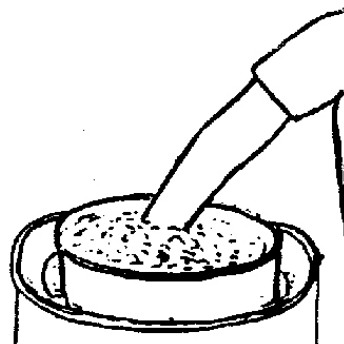
**By using a cheese knife, cut in two directions first towards yourself and secondly sideways to form squares of about 1cm wide. Thirdly cut at an angle across the vat (sufuria).**



**Fig. 3.8: Cutting the cheese releases the whey.**

### **3.2 7. Stirring the curd**

***After cutting the curd with a knife wash your hand with soap and rinse in plenty of clean water. Stir the curd gentle with your hand for 15 min. Agitating from bottom up, break up the bigger pieces of curd with your hand without crushing them.***

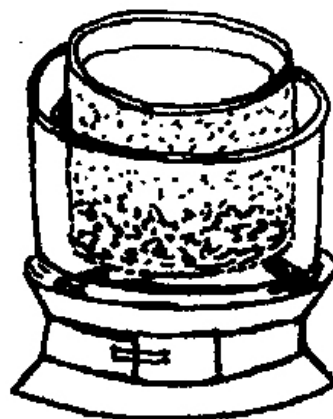


***Fig. 3.9: Clean hands may be used to stir small quantities of curd.***

### ***3.2.8. Curd ripening***

***Let the curd settle and remove some whey. Let the curd ferment (ripen) for 2 to 4 hrs. Maintain the temperature at 36°C if using sour milk as starter culture and 42°C if using a yoghurt starter culture. Raise the temperature gradually by adding in hot water.***





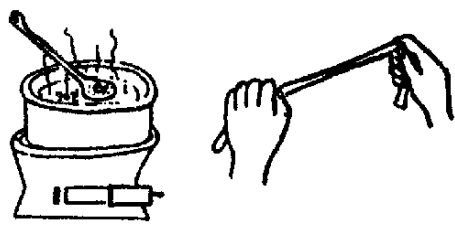
**Fig. 3.10: The curd settles down during "ripening".**

### **3.2.9. Curd spinning ability test**

***In order to know whether the curd has reached a point where it can be made to be elastic, it is necessary to conduct a spinning ability test.***

***i) Using a ladle scoop out a few curds and immerse in boiling water.***

***ii. Mould the curd like a chewing gum and try to stretch it.***



- iii. If the curd breaks, then it is not yet ready. Leave undisturbed for a few more minutes (5 to 10) before trying the test again.**



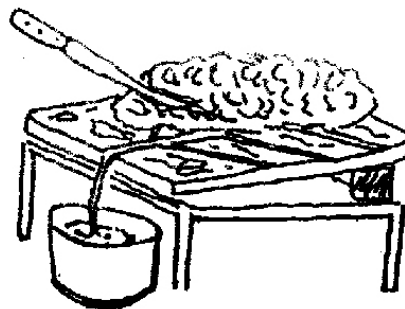
- iv. On a further trial, if the curd stretches like chewing gum, then it is ready for moulding.**



**Fig. 11 a-c: Curd spinning ability test.**

### **3.2 10. Cutting the curd**

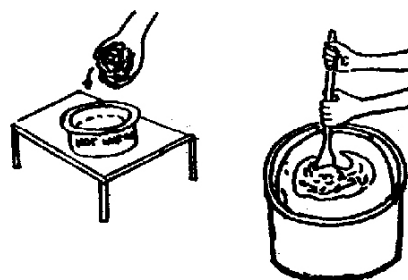
**Scoop the matted curd from the bottom of the cheese vat and cut it to small portions on a wooden tray placed in a slanted position.**



**Fig. 3.12: Cut the curd on a slanted table to facilitate whey drainage.**

### **3.2.11. Moulding the cheese**

- i. After cutting the cheese into small pieces, put about 1/2 to 1 kg of the cheese in a basin of hot water (80 - 90 °C). Have a bucket of cold water ready nearby.**
- ii. Stir the cheese curds in the hot water basin until it looks like a bread dough.**



**Fig. 3.13: Place the curd in hot water (> 80 °C) to melt it.**

- iii. Mould the gummy curd into a ball**

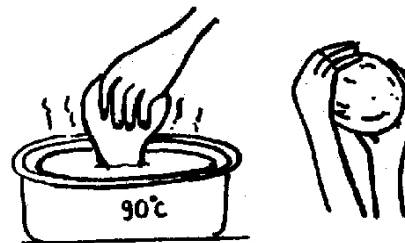


***iv. Pull the open end together and cut off the loose piece.***



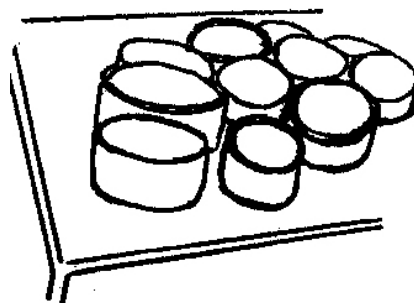
***v. Immerse the cut end into the hot water basin to seal off and smoothen the surface***

***vi. Smoothen off all the cheese's surface.***



**Fig. 13 a-c: Moulding the molten, cheese curd to a compact mass.**

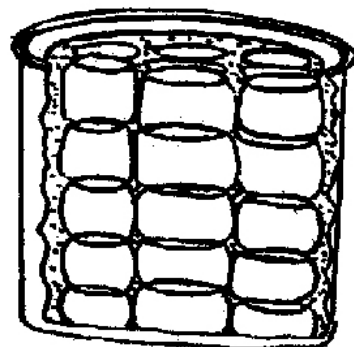
- vii. **Place the cheese in plastic moulds cut out of a 4" (for 1/2 Kg cheese) or a 6" plastic pipe (for 1 kg cheese).**



**Fig: 3.14: Smoothen the cheese surface to seal off holes.**

### **3.2.12. Cooling the cheese**

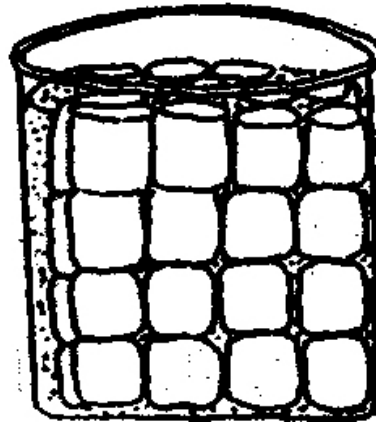
**After staying in the moulds for about 15 minutes, the cheese balls can be transferred into a bucket of clean tap water to cool down.**



***Fig. 3.15: Cool the worm cheeses in cold water to firm the body.***

### ***3.2.13. Brining the cheese***

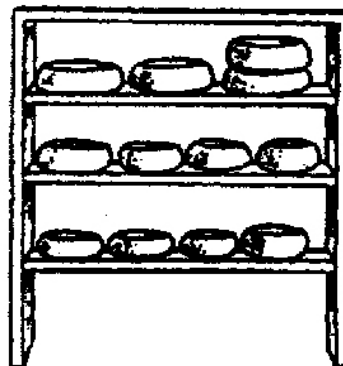
***After cooling in water for about one hour, the cheese is removed from the plastic mould and placed overnight in salt water containing 1 kg salt per 10 litres of water.***



***Fig. 3.16: Brining gives the cheese a good taste.***

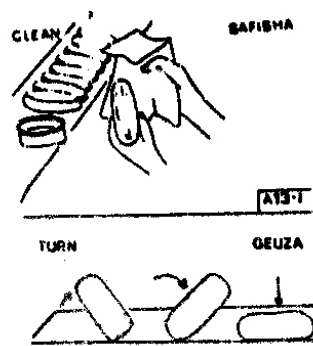
### ***3.2.14. Ripening the cheese***

***The cheese is placed on wooden shelves and turned once every day.***



**Fig. 3.17: The cheese is ripened for 10 -14 days.**

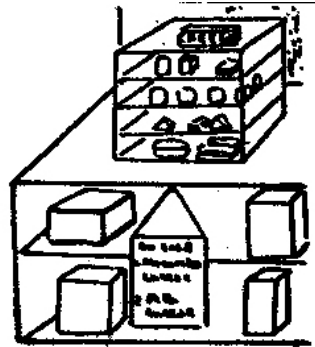
- i. After several days, moulds will have started to grow on the cheese surface. The cheese and the wood surface should be cleaned everyday with a clean piece of cloth or soft brush soaked in brine.**
- ii. Wipe all surfaces dry and turn over the cheese.**



**Fig. 3.18: Cleaning and turning daily is essential.**

### **3.2.15. Marketing the cheese**

***"Pasta Filata" cheese will be ready for sale at least 10 days after manufacture. The cheese should have a yellow and soft body. Before delivering to a shop or any consumer, clean the cheese thoroughly and place in clean cartons lined with plastic or white plain paper. Never use old newspaper for wrapping cheese.***



***Fig. 3.19: A good marketing strategy is crucial for success.***

### ***3.2.16. Utilization of Filata Cheese***

***Pasta Filata type of cheese is a cooked cheese. Therefore it does not develop strong flavour during ripening. When properly handled a semi-hard cheese with a soft body and a very mild, pleasant flavour results.***

- a. The cheese can be cut to small pieces and eaten with bread.***
- b. It is particularly suitable for use as cooking cheese as it can be grated and used with spaghetti or macaroni, as a salad dressing or used in pizza preparation.***



***One kilo of cheese has similar nutritive value to one kilo of meat or eight litres of milk.***



***Fig. 3.20: Pasta filata (Mozzarella) cheese is delicious and nutritious.***

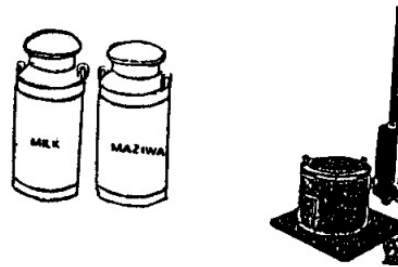
## ***4. HOW TO MAKE "ALPINE" FARMHOUSE CHEESE***

***The production of "Alpine cheese" as described here represents a family of semi-hard cheese, which originated in the mountainous region of Switzerland and France. It was traditionally made under farm household conditions. Cheeses such as Gruyere, Gouda and Tilsiter can be made with minor modifications using the "recipe" described hereunder:***

### ***4.1 Materials and equipment***

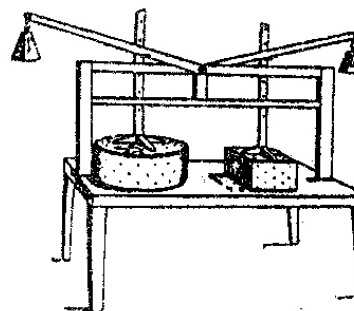
***To be able to make "Alpine" Farmhouse cheese on a small scale you will require the following:***

- a. **Milk: from at least 100 litres to as much as 500 litres or more.**
- b. **Rennet: in powder form or as tablets or a local rennet substitute (e.g. crude extract from calf or kid abomasum or adult sheep, goat or cattle abomasum)**
- c. **Charcoal stove or biogas burner for heating the milk.**
- d. **Starter culture: usually one that grows well at ambient temperature and of high gas producing ability (necessary for formation of holes in the cheese).**



**Fig. 4.1: Some materials required for cheese making.**

- e. **Various utensils: cheese vat, buckets, cheese knife, thermometer, colander, wash basin, running water, jugs, ladles, sufurias, cheese moulds, cloths.**
- f. **Press: a simple cheese press such as shown here can be easily made and used in pressing the cheese.**



**Fig. 4.2: A lever press may be made locally**

**g. Cheese curing room with wooden shelves or a small cupboard with, a temperature of 17°C to not more than 24°C and relative humidity of at least 80%.**

**CAUTION: The low temperatures required mean that this type of cheese can only be successfully made in the highland areas of E. Africa (> 1700 m.a.s.l.).**

## **4.2. Manufacturing steps**

### **4.2.1. Milk prey**

**Alpine farmhouse cheese is usually prepared from whole milk but standardised milk of not less than 3% butterfat may be used.**

**Whichever milk is used, it must first be filtered through a clean cloth or strainer to remove all physical dirt.**

### **4.2.2. Heating the cheese milk**

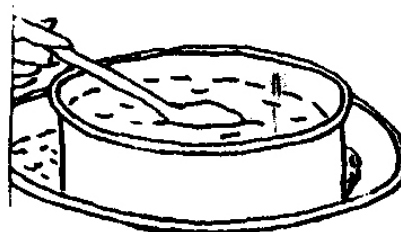
**After filtering the milk into the cheese vat or sufuria, heat the milk by putting it into a larger vessel containing water which is heated cover a charcoal or biogas burner. Heat the milk while stirring gently to 65°C and maintain at that temperature for 30 minutes.**



**Fig. 4.3: Pasteurising cheese milk ensures consistent quality**

#### **4.2.3. Cooling the milk**

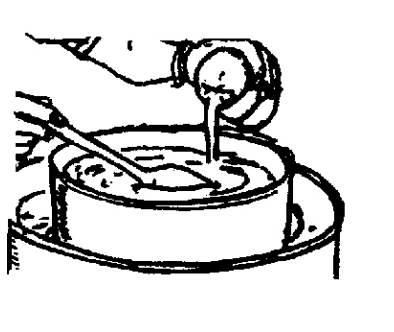
**After 30 min holding at 65°C, place the hot milk vessel in a larger vessel containing cold water. Stir the milk to hasten cooling. Change the cooling water several times if it gets too warm. The milk should be cooled to and maintained at 35°C.**



**Fig. 4.4: Rapid cooling is obtained by placing in a water jacket.**

#### **4.2.4. Starter culture Addition**

**Neat add a well-ripened starter culture at the rate of 2 % i.e 2 litres per 100 litres cheese milk. Stir gently for 5 min. Cover and leave undisturbed for 30 minutes.**

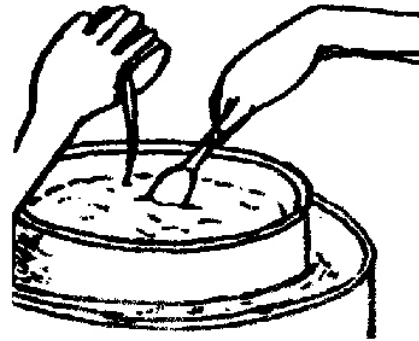


**Fig. 4.5: Add starter cultures while stirring.**

#### **4.2.5. Renneting**

**Add rennet according to suppliers instructions but ensure you add sufficient such that coagulation of the milk takes place in about 30 minutes.**

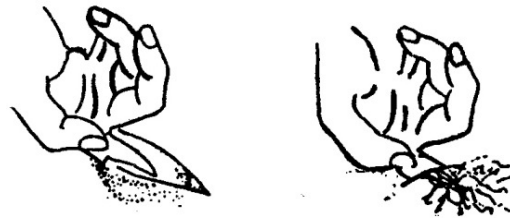
**Too much rennet may cause bitterness in the cheese while too little will take long to coagulate milk and the curd will be weak with subsequent high losses in the whey.**



**Fig. 4.6: Add rennet while stirring.**

#### **4.2.6 Testing curd firmness**

**To check whether the curd is ready for cutting, dip your forefinger and lift gently. If the curd breaks clean then it is ready for cutting. If it shatters give it a few uses mace and neat the test.**

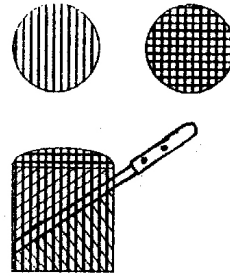


**Fig 4.7: If the curd shatters (right), it is not ready for cutting.**

#### **4.2.7. Cutting the curd**

**Once the curd firmness is satisfactory using a long knife, cut the curd vertically in one direction and then across at 1/2 inch inters. Lastly the curd is cut at an angle across the vessels. Leave the cut**

***curds for 10 min to allow initial whey separation.***



***Fig. 4.8: Cutting the curd uniformly releases whey.***

#### ***4.2.8 Stirring and cooking the curd***

***Stir the curd for 10 min while cutting the larger cubes with a knife. Remove some whey and warm it to 50(C and use it to raise the temperature of the curd slowly at the rate of 1 C in every 5 minutes until the temperature of the curds is 38 C in about 30 minutes.***

#### ***4.2.9. Further cooking of the curd and testing curd firmness***

***Continue stirring at 38(C intermittently for another 30 minutes. While stirring the curd, pick a few curds in your hand and press together. When the curds do not stick together but are firm to the touch with rubbery texture, they are by then well "cooked".***

#### ***4.2.10. Draining the whey***

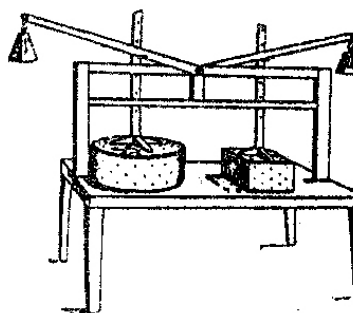
***Once the curds are sufficiently firm, whey is drained off by either***

***decanting, scooping or pouring through some cheese cloth.***

#### ***4.2.11. Pressing the curd***

***Put the curds in a cylindrical mould(such as a 3 litre plastic bucket in whose bottom and sidewalls, 3mm holes have been drilled) until it is full. Cover with a piece of cheese cloth. Cover with a fitting wooden follower. Place the cheese press cover in position and put on 10 kg weight for a 1 kg cheese.***

***After one hour of initial pressing the cheese are turned by quickly flipping the moulds over. Replace the cheese in the moulds upside down. The weight is increased to 15 to 20 kg per 1 kg cheese weight and the cheese is pressed overnight.***



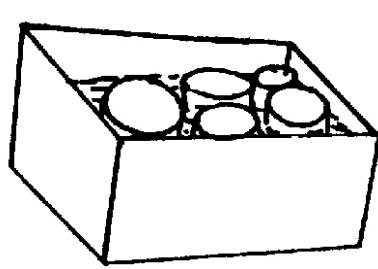
***Fig. 4.9: Simple lever press may be used to press the cheese.***

#### ***4.2.12. Salting the cheese***

***After removing the cheese from the mould, place the cheese in brine water containing 15 - 20% common salt. A good way of checking the***



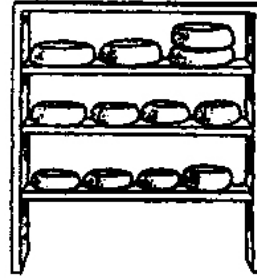
***right concentration of the brine, is to add salt to the water until an egg or Irish potato can float in it. Place the cheese in the brine for 12 hours. The cheese will take more salt the more they stay in the brine. Smaller cheese (e.g.500 g) may require shorter time (6 - 8 hours) to absorb same concentration of salt as the big cheese (1-2 kg) will absorb in 12 hours. With experience you will learn to keep each cheese just long enough for the right salt level in the final cheese.***



***Fig. 4.10: Salting by brine gives uniform salt distribution in the cheese.***

#### ***4.2.13. Curing the cheese***

***After removing the cheese from the brine water, the cheese is placed on wooden shelves in a curing room or cabinet.***



**Fig. 4.11: A cool, clean ripening room is important for good quality cheese.**

**The cheese is turned once every day for the first 4 a 5 days. In high altitude areas (1700 m) lower and more stable temperatures (17-22 C) and higher humidity may be more easily attained in underground cellars (3-4 m) below ground.**

**After 1 week the cheese may be turned every other day and wiped with a strong salt solution to remove the moulds. The wooden shelves should also be thoroughly cleaned with brine and occasionally scrubbed with hot water and let dry before replacing the cheese. Strive to keep the surface of the cheese as clean as possible. The cheese is usually ripe in 6-8 weeks.**

## **5. HOW TO MAKE FETA CHEESE**

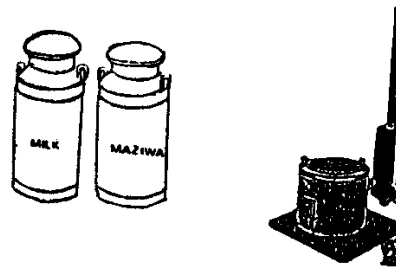
**Feta cheese belongs to the so-called "white pickled" group of cheeses. In Greece, where this type of cheese originates, it has traditionally been made from sheep milk. Nowadays and in many parts of the world, Feta cheese is made from cow milk whose fat**

***content has been adjusted to 3%. In East Africa in several localities with a strong Greek influence, Feta cheese is being manufactured under relatively simple conditions utilising common equipments. Due to its high salt content, it can keep for up to 1 year in 15 %salt brine. Thus its manufacturing steps are described here in detail.***

### ***5.1 Materials and equipment***

***To be able to make Feta cheese at the farmhouse or village level you will require the following:***

- a. Milk: from at least 100 litres to up to 500 litres or more.***
- b. Rennet: in powder form or as tablets or a local rennet substitute (e.g. crude extract from calf abomasum or those of adult cattle, sheep, or goats may be used).***
- c. Fuel wood store or tunnel boiler for warming/heating the milk.***

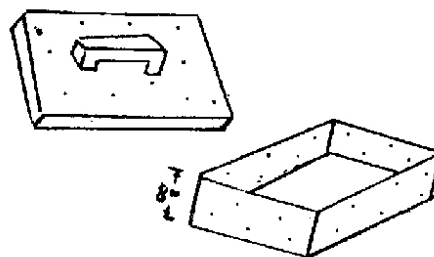


***Fig. 5.1: Some materials required for cheese making.***

- d. Starter culture: a lactic starter culture or a well fermented sour milk may be used with satisfaction.***

- e. ***Various such as: cheese vats, buckets, cheese knives, thermometer, colander, wash basins, running water, cups, ladles, sufurias, cheese cloth etc.***

***Cheese moulds: for this type of cheese, square moulds are ideal.***



***Fig. 5.2: Simple wooden cheese moulds may be used***

- f. ***Cheese curing brine vessels such as plastic buckets, used cooking oil tins (need to be changed frequently due to corrosion) or day pots may be used.***

## ***5.2 Manufacturing steps for Feta***

### ***5.2.1 Milk standardisation***

***Since Feta cheese has traditionally been made from sheep milk, milk fat must be standardised to 3 % to obtain Feta of good quality from cow milk. Hence milk separation to obtain skim milk to be used for reducing the fat.***

***Adjustment of the fat content of the cheese milk is the first step in Feta cheese production from cow milk. (seek further advice on how to standardise milk to fat content).***

### ***5.2.2 Heating the cheese milk***

***After standardising the milk, it is put in a large container known as "vat" . The milk is heated by hot water contained in a larger vessel. For small amount of milk, water in a large aluminium vessel (40 litres) may be used to heat milk placed in a small vessel (20 litres). The water may be heated using an improved wood fuel stove, tunnel water boiler or biogas burner The milk is heated to 35 °C only.***



***Fig. 5.3 Pasteurise milk for safe, good quality cheese.***

### ***5.2.3 Starter culture addition***

***Sour milk or a lactic starter culture may both be used with satisfactory results About litres of starter is added for each 100***

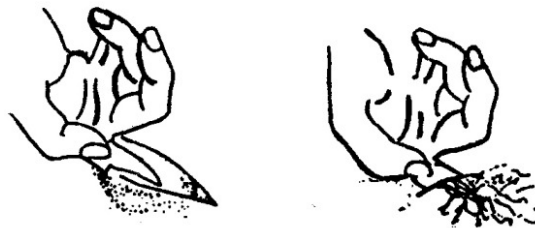
***litres of cheese rapt well for about min and allow to ripen for 30 min.***

#### ***5.2.4 Addition of Rennet***

***While the milk is left to ripen for 30 min, dissolve one tablet (for 100 litres milk) or an appropriate measure of powder in a little water. Add a pinch of salt to the rennet solution. After the ripening period (30 minutes) is over, add the rennet solution to the cheese milk (maintained at temperature of 32-35 C) and stir for 5 min. Replace the lid of the cheese vat and leave undisturbed until coagulation occurs in 30-45 minutes.***

#### ***5.2.5 Testing curd firmness***

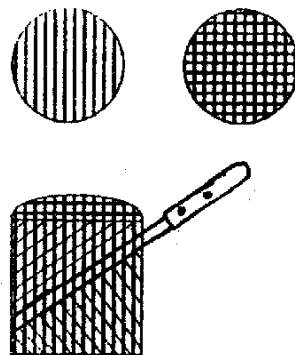
***When a coagulation has formed, stab it with the forefinger or knife and lift. If it breaks clean, then the curd is ready for cutting. If it shatters give it a little more time.***



***Fig. 5.4: Ensuring the curd is firm before cutting is important for good cheese yield.***

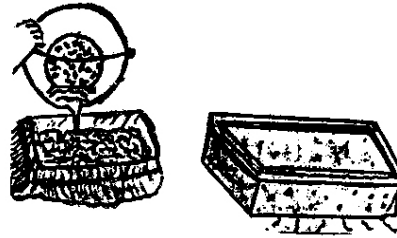
### **5.2.6 Cutting the curd**

***When coagulation shows a clean break it is ready for cutting. By using a long knife, cut the curd in two directions; first towards yourself and secondly sideways to form square of about 2 - 3 cm wide. Thirdly cut at an angle across the vat or sufuria. After cutting leave the curds undisturbed for some 15 minutes. A yellowish green whey begins to separate.***



***Fig. 5.5: Cutting the curd releases whey.***

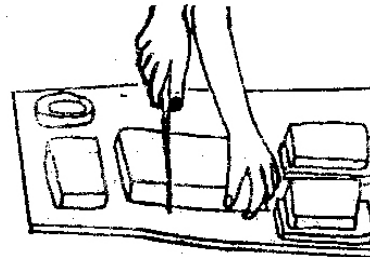
***After letting the curds settle for 15 minutes, decant some of the whey. Scoop out the curds and place in square cheese moulds lined with cheese cloth. Place the lid on the mould. Invert after 1 hr and allow whey to drain overnight.***



**Fig. 5.6: Use shallow (4" deep) square moulds.**

### **5.2.8 Cutting the cheese blocks**

**On the morning of the following day, cut the cheese block into small pieces (e.g 2cm x 5cm or 5cm x 10 cm) and sprinkle them with salt.**

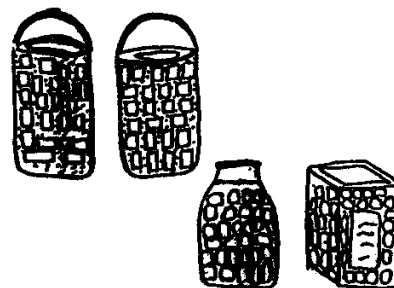


**Fig. 5.7: Cut the cheeses into small portions for brining.**

### **5.2.9 Brining and storage of Feta cheese**

**After 1 - 2 hrs the cheese pieces are immersed in 15% salt solution whereby it will absorb salt at the rate of 6-8% of its weight. For prolonged storage it is advisable to seal the containers. This will prevent, the growth of salt tolerant molds. Under such conditions the cheese will keep well for up to 1 year.**





**Fig. 5.8: Feta cheese may be stored in brine for up to 6 months.**

### **5.2.10 Feta cheese utilisation**

**Because of the high salt content, Feta cheese may be desalted by placing it in clean water for a few hours and dressed in table cream before consumption. Alternatively the cheese may be ripened in brine containing 7-8% salt instead of 15% if it is not intended to keep the cheese for too long.**

**Feta cheese may be used for pizza, sandwich and on macaroni or salad.**

### **REFERENCES:**

**O' MAHONY F. 1985. ILCA manual No. 4. Rural Dairy Technology; Experience from Ethiopia.**

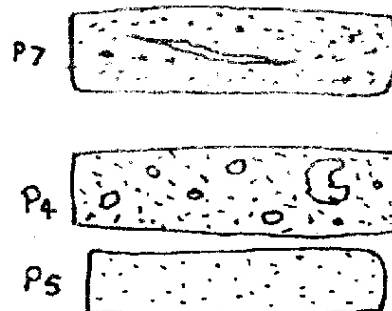
### **ANNEX:**

### **CHEESE MILK QUALITY REQUIREMENTS AND ADJUSTMENTS**

## **1. Milk Quality:**

***Cheese milk should be of good composition as this influences most of the consumer preferred characteristics e.g. texture, body, flavour and aroma in the cheese. Some fat is especially required to avoid hard and leathery characteristics in ripened cheeses. Milk used in cheese making should be fresh and of low microbial load; acidification affects processability and quality of final cheese.***

***Cheese milk should be free from contaminants such as antibiotics, sanitizing agents, detergents and other inhibitors which affect processability by destroying cultures and affect rennet coagulability:***



***Annex. Fig: I: Common cheese defects: Cracks (p7), excessive eye formation (p4) and compact mass (p5)***

## **2 Filtration and Clarification:**

***Cheese milk should be well filtered in order to remove the physical***

***impurities and debris which affect cheese quality.***

***Pasteurisation:***

***Cheese milk should be well filtered in order to remove the physical impurities and debris which affect cheese quality.***

***3. Pasteurisation:***

***Cheese milk should be pasteurised in order to meet the following requirements:***

- a. Kill disease causing microbes (pathogenes) hence safeguard health of the cheese consumer.***
- b. ii) Kill spoilage microbes (e g. coliforms, yeasts, sporeforming bacteria) which cause "blowing" and bitter defects of cheese through unwanted fermentations.***
- c. iii) Inactivate natural inhibitors which affect cheese processing.***

***NOTE: Overheating of cheese milk should however, be avoided as it results in processing difficulties e.g. delayed rennet coagulation and weak delicate curds due to insolubilization of calcium salts required in the coagulation process.***

***4. Thermization:***

***Long chilling of milk leads to insolubilization calcium ions, but they are required in their soluble form in rennet cheese manufacture. To***

***make them soluble again, moderate heating (Thermization) of chilled milk is required.***

***Thermization involves heating of the chilli milk at 65 C/15 seconds in order to convert the insoluble calcium ions to the soluble form for proper coagulation using rennet:***

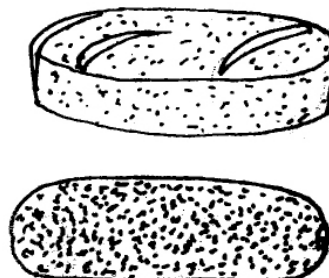
#### ***5. Additives in cheese milk:***

##### ***Calcium chloride (CaCl<sub>2</sub>):***

***It is added at the rate of 10 - 20 grams per 100 litres of milk (or 0.02% maximum ) to restore the calcium level changed during handling and heating processes. Correct calcium level is required for proper coagulation using rennet.***

##### ***Sodium or Potassium nitrate/nitrite (KNO<sub>3</sub>/NaNO<sub>3</sub> or KNO<sub>2</sub>/NaNO<sub>2</sub>)***

***It is added at the rate of 10 - 20 grams, per 100 litres milk (or 0.02% maximum) to prevent growth of gas producing spoilage microbes e.g. coliforms (which cause blowing of young cheese) and spore forming bacteria (which cause blowing of aged cheese and bitter taste).***



***Annex Fig. 2: Cheese blowing defects.***

## ***6. Colour additives***

***Carotene or Anatto are the main colour additives added in cheese milk at the rate of 0.06% maximum to impart the desirable yellowish colour of cheese hence even out colour variations especially during the dry season when the green fodder (a source of yellow pigments in mills) is not available.***

## ***7. Starter culture:***

***A starter culture in cheese making is a medium of harmless, active micro organisms which by growing in cheese milk and curd assists the development of mature cheese with desirable characteristics of flavour, aroma, pH, texture and body.***

***The choice of starter will depend on:***

### ***i) Type of cheese***

**ii) Activity required of it e.g. propionic acid development, gas production, lactic acid production, lipolysis etc**

**iii) Cooking temperature to be used. (influenced by type of cheese) e.g. where cooking temperature to be used is 38 - 40 C, a thermophilic starter is preferred; while for 32 - 45 C, a mesophilic starter is preferred.**

**Mixed starters are preferred due to:**

- 1. Resistance to bacteriophage attack**
- 2. Good adaptation to environmental characteristics of temperature, pH, salt concentration etc.**

**Starter is added at the rate of 1 - 3% of the quantity of cheese milk.**

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***Starter is added at the rate of 1 - 3% of the quantity of cheese milk.***

***8. Milk coagulants.***

***Organic acids:***

**1. Direct addition of an external edible acid like lemon juice, vinegar, citric acid etc. into hot fresh milk to cause curd separation from whey e.g. in lemon cheese rung.**

**2. Acidification of cheese milk by inoculation of a lactic starter culture into pasteurised milk. Fermentation of the milk sugar (lactose) will result in production of lactic acid and coagulation of milk proteins leading to formation of curd and separation of whey.**

### **Enzymes (Rennet)**

**Commercial rennet is supplied in two forms:**

**i) Powder**

**ii) Tablets**

**Addition in cheese milk for good coagulation is at the rate of 2.5 grams per 100 litres of cheese milk. The rennet should be diluted at least 10 times in clean cold water.**

**Where commercial rennet is not available, one can make his/her own rennet from the abomasum of cattle, sheep or goats.**