C. GEOGRAPHICAL ZONE OF ORIGIN OF THE RAW MATERIAL FOR THE PRODUCT

The geographical zone in which the milk is produced from which Feta cheese is made is defined by the administrative boundaries of the following areas:

1. Geographical section of Mainland Greece: the prefectures of Attica, Viotia, Fthiotida, Fokida, Euritania, Etolia-Akarnania and Evia.

2. Geographical section of the Peloponnese: the prefectures of Corinth, Argolida, Arkadia, Achaia, Ilia, Lakonia and Messinia.

3. Geographical section of Thessalia: the prefectures of Larissa, Trikala, Karditsa and Magnissia.

4. Geographical section of Epirus: the prefectures of Ioannina, Thesprotia, Arta and Preveza.

5. Geographical section of Macedonia: the prefectures of Thessalonika, Halkidiki, Kilkis, Imathia, Pieria, Pellas, Florina, Kozani, Kastoria, Grevena, Kavala, Drama and Serres.

6. Geographical section of Thrace: the prefectures of Evros, Xanthi and Rodopi.

7. The prefecture of Lesbos.

It is prohibited to use milk from areas other than those stipulated above in the preparation of Feta cheese.

Appendix: Map of the geographical zone of origin of the raw material from which the product is produced.

D. THE RAW MATERIAL USED IN THE PREPARATION OF THE PRODUCT

Feta cheese is traditionally prepared from pure ewe's milk or from a mixture of ewe's and goat's milk, in which the proportion of ewe's milk far exceeds that of the goat's milk.

The development of goat and sheep farming both in the area in which Feta is produced and in the rest of Greece and its promotion from ancient times up to the present day as the main, if not exclusive form of dairy farming in numerous areas is the result of the geo-physical and climatological conditions peculiar to Greece. The high proportion of mountainous land and the hot, dry climate were the main and decisive factors. As a result, breeds of goats and sheep have been developed with a strong constitution, which could adapt to these difficult conditions. These breeds, which are adapted to the physical conditions and make use of pasture lands with a surprising variety of flora, unique in its number of endemic species, are distinguished by their low level of milk production and by the particularly rich chemical composition of the milk and its exceptional organoleptic properties. The quality of goat's and ewe's milk, together with the experience of the cheese-makers, has resulted in a series of choice cheeses, the most internationally famous of which is Feta.

I. PHYSICAL CONDITIONS IN THE AREA IN WHICH THE RAW MATERIAL IS PRODUCED

a) Climate

Greece as a whole has a Mediterranean climate, which displays the features of a temperate climate in the winter and of a sub-tropical high pressure climate during the summer, in other words there is a rainy winter period and a dry summer period with low annual rainfall, mild winters, hot summers and long hours of sunshine throughout the year, especially during the summer period.

The variety of differentiations in the Greek climate from region to region, is due to the combined effects of the physical, geographical and dynamic factors of the climate on Greece.

The annual level of atmospheric precipitation drops as a rule from west to east and from north to south, with deviations from the rule due to local causes. The geographical position of the country and the high mountain ranges which cross it are the most influential factors in the distribution of rainfall from one area to another.

As far as rainfall measurement is concerned, the section of the country in which Feta cheese is produced has a dry and a wet period, the duration of which varies according to geographical latitude and height. The dry period begins at the end of spring and lasts until autumn. This is sometimes interrupted by rain in the form of storms. The wet period begins in autumn and lasts until the end of spring.

The average annual rainfall, the number of days' rain and their distribution during the wet and dry periods of the year in the areas of Athens, Thessalonika, Ioannina, Trikala and Tripoli, where most Feta is produced, is as follows (1931 - 1975):

Mainly wet period (November - February)	
Rainfall measurement (in mm)	396.9
Number of days' rain	49.5
Mainly dry period (August - September)	
Rainfall measurement (in mm)	105.7
Number of days' rain	20.6
Remaining period (March - October)	
Rainfall measurement (in mm)	250.1
Number of days' rain	42.2
Total for the year	
Rainfall measurement (in mm)	752.7
Number of days' rain	112.4

The average annual relative humidity in the section of the country in which Feta is produced varies from 62% to 74% and breaks down by area as follows:

Meteorological station	Humidity %	Meteorological station	Humidity %
Athens	62	Larissa	67
Arta	70	Methoni	74
Volos	68	Mytilene	63
Thessalonika	69	Nafplion	66
Ioannina	67	Patras	67
Kalavryta	68	Serres	67
Kalamata	69	Sparta	63
Komotini	66	Trikala	65
Corinth	68	Tripoli	64
Kyme	66	Florina	70
Lamia	64	Halkis	69

Greece falls between the annual isotherms of 12.5°C and 20.0°C. The temperature drops during the cold period according to geographical latitude and during the hot period from the hinterland of the country towards the coast. Minimum temperatures sometimes reach -20°C in the northern sections of the country, while in the south they rarely fall as low as 0°C. The highest temperatures are to be observed in the hinterland of the country and sometimes exceed 40°C. Over recent years the air temperature, especially in the large towns, has been known to rise as high as 45°C.

Greece has little cloud cover and, more importantly, few days without sunshine. The average annual number of cloudy days varies between 30 and 90. Greece on the whole, generally enjoys a great deal of sunshine with the average annual sunshine varying between 2,300 and 3,100 hours (Chronopoulou 1993).

b) The terrain

Approximately 2/3 of the areas in which Feta is produced are mountainous (over 200 metres high) and only 1/3 are lowlands or semi-mountainous (hills up to 200 metres high).

Pasture land accounts for over half the surface of the country. The distribution, according to land use, of farm land, pasture lands, forests and other areas is as follows:

	Lowlands	Semi-mountainous areas	Mountainous	Total (1,000 km^2)
Cultivated land	22	10	8	40
Pasture lands	11	15	27	53
Forests	3	8	19	30
Other use	4	2	3	9
Total	40	35	57	132

(National Dairy Committee of Greece, 1984)

c) Flora

The flora in the Balkans is, without doubt, the richest in Europe, in that not only does it have the greatest number of species compared with any other area of Europe, it also has the greatest number of endemic species which cannot be found anywhere else in the world. Its vicinity to the primordial flora of Asia Minor and the area of Pontous has lent some of the flora in the Balkans an extra-European character. Through gradual migration from the east via Thrace and the Aegean, 680 such species of flora have made their way to Greece (Polunin, 1980).

The natural flora in Greece comprises some 6,000 species, 15% of which (or according to others 20%) are endemic, an exceptionally high number, if we take account of the size of the country. It ranks first among all the countries of Europe and second after the Iberian peninsular. The number of endemic species is high even compared with that of larger countries such as Germany, the United Kingdom or France.

This figure of 6,000 species in Greece is impressive if we compare it with the 20,000 species in the Mediterranean area as a whole (southern Europe, North Africa and part of western Asia). The reasons for this wealth of species are as follows:

a) Geo-historical: smooth geological development helped to maintain tertiary elements from the Cainozoic era.

b) Geographical position: Greece forms a bridge between three continents, resulting in the transfer, accidental or otherwise, of numerous species of flora of varying origin from one continent to another (Voliotis, 1987). Map 1 shows the migration routes of flora in the Balkans (Polunin, 1980).

c) The exceptionally complicated and multiform geo-technical morphology of Greece (mountainous and semi-mountainous areas account for 70% of the surface of the country and there is a coastline 15,000 km long). Consequently, there is a particularly large number of varying ecological communities which are dependent on extensive differences

in the geological bed and the local climate (Voliotis, 1987).

Map 2 shows the geographical distribution of the country's flora, not including the islands of the eastern Aegean.

The endemism of the flora has been fostered mainly in isolated communities such as the Athos peninsular, Olympos, the Taygetus, Crete and areas of the Aegean. Map 3 (Polunin, 1980).

The Greek species are mainly neo-endemisms, although there are some paleo-endemisms from the Tertiary Period which have been preserved mainly in rocky parts, due to limited competition. A typical example of paleo-endemic flora is the Gesneriaceae genus (Voliotis, 1987).

Other examples of endemic flora include the Asteraceae, Cichoriaceae, Lamiaceae, Caryophyllaceae genera and the Centaurea, Dianthus, Silene, Campanula and Verbascum genera with some 50 to 100 species each.

Below is a list of some endemic species and the areas in which they grow:

Jankaea heldreichii, Paraskevia cesatiana, Petromarula pinnata, Wagenitzia lancifolia (Olympos, Peloponnese), Aubrieta erubescens, Anthemis sibthorpii, Helichrysum sibthorpii, Centaurea peucedanifolia, Achillea absinthoides, Viola athois (Athos), Asperula muscosa, Campanula oreadum, Rhynchosinapis nivalis, Silene dionysii, Viola pseudograeca, Viola striis-notata, Festuca olympica, Pulsatilla montana subsp. olympica (Olympos), Geranium humbertii, Viola brachyphylla (Voras), Sempervivum ballsii (Grammos, Smolikas), Viola vourinensis (Vourinos), Onobrychis aliacmonia (Aliakmonas), Limosella tenella (Tymfi), Alyssum taygeteum, Campanula papillosa, Hypericum taygeteum, Onosma taygetea, Scrophularia taygetea, Micromeria taygetea, Viola sfikasiana, Sesleria taygetea (Taygetus), Teucrium aroanicum, Trachelium asperuloides, Saxifraga taygetea sub. chelmea (Chelmos), Galium cyllenium, Verbascum cylleneum (Kyllini), Astragalus agraniotii (Parnon), Asperula arcadiensis, Colchium psaridis, Viola mercurii (Peloponnese), Consolida tuntasiana (Gerania, Corinth), Verbascum pentelicum (Penteliko), Fritillaria obliqua (Attica), Fritillaria conica (western Peloponnese), Fritillaria davisii (southern Greece), Fritillaria rhodocanakis (Hydra), Allium phthioticum (Oiti), Allium macedonicum (Pangaion), Viola ransii (Ossa, Pilion), Verbascum pelium (Pilion), Petrorhagia fasciculata (Akarnania), Alyssum euboeum, Campanula euboica, Onosma euboica, Nepeta dirphya, Viola euboeae, Fritillaria euboeica (Evia), Aubrieta scyria, Scorzonera scyria (Skyros), Campanula scopelia, Papaver stipitatum (Skopelos), Centaurea ipsaria, Lotus aduncus, Ranunculus thasius (Thasos).

In addition to the foregoing, Greek flora also includes Balkan endemic species such as:

Delphinium balkanicum, Centaurea epirota, Centaurea grbavacensis, Campanula formanekiana, Trachelium jacquinii, Cephalaria ambrosioides, Alkanna pindicola, Melampyrum heracleoticum, Digitalis laevigata, Saxifraga

stribrnyi, Viola aetolica, Viola delphinantha, Viola dukadjinica, Viola orphanidis, Viola perinensis, Fritillaria gussichiae, Lonicera formanekiana et al.

In addition to local endemic species of Greek flora, there are also elements of various origin, such as northern European, Euro-Siberian, eastern Asian, western, southern African and multizonal or cosmopolitan species (Voliotis, 1987).

The flora in rocky areas is particularly rich in rare species. The most important genera are:

Cerastium, Silene, Dianthus, Onosma, Sempervirum, Sedum, Sarifraga, Potentilla, Linum, Hypericum, Asperula, Stachys, Verbascum, Romonda, Campanula, Trachelium, Staehelina, and other genera in the Lamiaceae, Brassicaceae, Asteraceae, Cichoriaceae and other families.

Special mention should be made of the flora on the coasts which tends to be uniform due to the uniformity of the climate and the wide distribution of numerous species. The weak tides, the lack of large rivers and other factors have limited their variety. Note is made of the following species:

a) Rocky shores and foreshores:

Arthrocnemum fruticosum, Salsola kali, Matthiola tricuspidata, Cakile maratima, Eryngium maritimum, Eryngium creticum, Crithmum maritimum, Inula crithmoides et al.

b) Sandy shores:

Pinus pinea, Polygonum maritimum, Glaucium flavum, Malcolmia flexuosa, Cakile maritima, Medicago marina, Euphorbia peplis, Tamarix spp., Eryngium maritimum, Eryngium creticum, Echinophora spinosa, Cionura erecta, Calystegia soldanella, Xanthium strumarium, Pancratium maritimum et al (Polunin, 1980).

The following families of self-sown grass plants and papilionaceae are the edible species which sheep and goats like to graze on best:

a) Papilionaceae (Fabiaceae): Pisum, Vicia, Lathyrus, Medicago, Trifolium, Lotus, Ornithopus, Onobrychis, Astragalus, Ononis, Anthyllis et al.

b) Grass plants (Poaceae): Poa, Festuca, Phleum, Dactylis, Sorghum, Bromus, Agrostis, Cynodon, Hordeum, Avena, Aegilops, Koeleria et al (Voliotis, 1993).

Map 1: The main flora migration routes (Polunin, 1980)

Map 2: Botanic areas and number of species known in each area (Polunin, 1980)

Map 3: Emboldened characters: Number of endemic species in each botanical area
Non-emboldened characters: Number of Balkan endemic species in each botanical area
(Polunin, 1980)

II. TYPES AND BREEDS OF ANIMALS WHICH PRODUCE THE MILK USED TO PREPARE THE PRODUCT

It is a well-known fact that the type and breed of animals raised and the level of development of livestock farming in an area are highly dependent upon the geo-physical and economic conditions which prevail in it. Most of the surface of continental Greece, which is where most Feta is produced, is mountainous or semi-mountainous land with sharp gradients and often reduced or a total lack of tree growth. At the same time, the prevalent climatological conditions favour natural growth only during specific periods of the year, which are of relatively short duration. Finally, even today, a high proportion of the population is employed in primary production, so that agricultural lots remain small.

Given the above conditions, the only productive animals which could be bred were small ruminants. Sheep- and goat-farming was traditionally the main, if not the only employment of livestock farmers in Greece. Greece has no cattle-rearing tradition, due to a lack of rich natural meadows. The inability to produce sufficient cheap fatstock, due to the geographical position of the country and the quality of its soil has lead Greece to be regarded as a goat- and sheep-farming country (Katsaounis 1986).

The fodder for the sheep and goats is based almost exclusively on growth in pasture lands of generally poor pasturing potential but with especially rich flora. One important feature of the mountainous and semi-mountainous pasture lands in Greece is their lack of pesticides, parasiticides, weedkillers, insecticides and other agricultural medicines. There is a particularly low concentration of lead and other pollutants, due to the absence of major trunk roads in these areas. As a result of the absence of such substances in the environment and in the flora on which the sheep and goats feed almost exclusively in the mountainous and semi-mountainous areas of the country, the milk and cheese produced from them is almost entirely uncontaminated, in contract to the milk from animals fed on cultivated fodder.

The systems applied to breeding in Greece are generally extensifiable and over-exploitation of pasture lands is usual (Katsaounis, 1986).

It is under these difficult conditions that a domestic sheep and goat population has developed which, generally speaking, eats frugally and is extremely resistant. Its output is low but has a high solid matter content.

The main features of Greek goat- and sheep-farming are as follows:

a) there is a large number of livestock farms and a small number of animals per farm. For example, 66.1% of sheep farms and 91.2% of

goat farms have breeding units with less than 50 animals (National Statistics Bureau of Greece, 1991);

b) the breeds of sheep and goats are unimproved, and are well adapted to the difficult geo-physical and climatological conditions which prevail but they have a low milk yield;

c) the entire sheep and goat population is milked;

d) lambs and kids are generally slaughtered after weaning (40-60 days);

e) sheep and goat are mainly reared in mountainous and semi-mountainous areas;

f) animals are mainly fed by pasturing;

g) the system of moving to summer pasture lands is applied to most extensifiably reared flocks in mountainous areas (Hatziminaoglou & Associates, 1985, a).

The distribution of the population of milked sheep and goats between lowlands, semi-mountainous and mountainous communities and by type of breeding (domestic, in flocks and nomadic) is as follows:

	Total	Communities		
		Lowland	Semi-mountainous	Mountainous
Sheep	6,667,945	2,415,167	1,929,557	2,323,221
Domestic & in flocks	6,090,130	2,194,980	1,697,522	2,197,628
Nomadic	577,815	220,187	232,035	125,593
Goats	3,717,895	676,061	1,247,654	1,794,180
Domestic & in flocks	3,506,196	624,014	1,140,454	1,741,728
Nomadic	211,699	52,047	107,200	52,452

(National Statistics Bureau of Greece 1991a)

The distribution of the production of ewe's and goat's milk in the area in which Feta cheese is produced is as follows (figures in tonnes):

Area	Ewes' Milk	Goats' Milk
Eastern Macedonia & Thrace	50,441	32,866
Western and Central Macedonia	83,763	61,447
Epirus	89,945	39,668
Thessalia	125,283	69,753
Peloponnese & Western Mainland Greece	151,569	131,557
Central and Eastern Mainland Greece	54,930	47,375
Lesbos	18,082	464

(National Statistics Bureau of Greece, 1991b)

Most of the sheep reared in the area in which Feta is produced, and in Greece in general, have a common genetic base but show differentiations of characteristics according to the specific conditions in the area in which they are reared. They are small animals, which are adapted to the difficult geo-physical and climatological conditions in Greece and which have a low milk output (80 - 120 kg per annum) but yield milk of excellent quality. The fundamental factor which contributes to the quality of the milk is the method by which they are reared and the variety of flora in the Greek countryside. Most Greek sheep are of the Zackel breed (Ovis Aries L.). In addition to domestic breeds of sheep, foreign breeds are also reared, as are cross-breeds of foreign and domestic sheep, but their milk is of a weaker composition and is mainly used for self-consumption or in the preparation of yoghourt (Hatziminaoglou & Associates. 1985).

Most of the goat population (approximately 80%) is from domestic breeds. Approximately 14% consists of improved animals which have been crossed with various foreign breeds and some 6% belong to the Saanen breed. Domestic goats have similar colourings and the features of the unimproved animal. For example, they are small in size, with a thin coat, a low milk output and a strong constitution. Their annual output varies from 50-100 kg of milk for animals in mountainous areas and 120-150 kg for animals in lowland areas. Local goats in mountainous and semi-mountainous areas are reared exclusively by free grazing. In lowland areas, where improved or foreign breeds are kept, animals tend to be reared domestically or semi-domestically. The milk produced by the improved or foreign stock is not used in the production of Feta, due its low total solid matter, but for self-consumption (Hatziminaoglou & assoc., 1985).

III. QUALITATIVE PROPERTIES OF THE RAW MATERIAL

Feta cheese is traditionally produced from ewe's milk. This milk gives the best quality cheese, which is why it monopolizes the interest of cheese-makers in Greece. Good quality Feta is also produced from goat's milk which is mixed with ewe's milk in a proportion which does not exceed 30%.

Ewe's and goat's milk differ significantly from cow's milk, both in their chemical composition and in their suitability for cheese. This differentiation is even more acute in the case of the domestic, non-improved breeds with a low output which are prevalent in Greece and which are distinguished by the milk they yield which has a particularly high level of solid matter and a full-bodied smell. This is due to the peculiar conditions of the climate, the geo-physical profile and the flora.

Generally speaking, the distinguishing characteristics of ewe's and goat's milk, in comparison to cow's milk, are the higher content in proteins, fat and dry matter, which affects the output and qualities of the cheese. The average chemical composition of milk from the ewes and goats reared in the area in which Feta is produced are given in the table below and show the rich composition of the milk.

Type of milk	Fat %	Total protein %	Casein %	Lactose %	Ash %	Dry matter %
A. Ewe's milk						
Karagouni	8.70	6.60	5.02	4.58	0.93	20.31
Vlachiko	9.05	6.52	4.98	4.69	0.95	20.61
Chios	7,85	5.47	4.41	4.79	0.92	19.08
Attica	7.59	5.94	4.63	5.09	0.89	18.98
B. Goat's milk						
Attica	5.63	3.77	3.06	4.76	0.80	14.79
Argos	5.92	3.99	-	4.51	-	-
Metsovo	5.18	3.56	-	4.74	-	-
Skopelos	5.34	3.88	-	4.58	-	-

(Anifantakis et al., 1980, Anifantakis & Kandarakis, 1980, Simos et al., 1991, Agricultural University of Athens).

However, apart from the quantitative differences, there are also qualitative differences between the various types of milk which affect the

output of cheese and the mechanical, physical, chemical and organoleptic properties of Feta. The most significant differences are as follows:

a) ewe's and goat's milk contain no carotene, with the result that the rennin produced by it is naturally white in colour, unlike the rennin produced by cow's milk, which is yellowish in colour. In order to

make the latter white, various colourings are added to the milk to be made into cheese; apart from the fact that these are not natural components of the milk, moves are already being made at Community level to prohibit their use;

b) the fat content of the milk is a source of constituents which contribute significantly to the smell and taste of the ripened cheese. The presence of fatty acids in the structure of the fat in the milk affects the final smell of the cheese. Both ewe's, and especially goat's milk contain significant quantities of caproic, caprylic and capronic acid, with the result that the Feta produced from these types of milk has a richer distinctive smell and a more pungent (peppery) taste, which cannot be achieved when cow's milk is used. The differences in the composition of the fatty acids cause differences in the physical and chemical properties of the fat in the three types of milk (different values for the Reichert-Meissl, Pelenske etc. numbers). The average composition in fatty acids of the fat in cow's ewe's and goat's milk is as follows:

Animal	Fatty acids									
	C4	C6	C8	C10	C12	C14	C16	C18	C18.1	Other
Cow	2.0	2.2	1.1	3.0	2.7	9.0	25.0	13.8	33.0	7.3
Sheep	4.2	2.0	2.2	6.0	3.1	5.5	16.9	15.8	38.8	5.5
Goat	3.1	2.8	3.0	10.1	6.0	12.2	27.2	27.5	25.6	3.7

(Scott, 1981)

c) there are also qualitative and quantitative differences in the casein particles in the three types of milk, with the result that their hydrolysis products also differ. It is these which, together with the free fatty acids, determine the taste of Feta;

d) there is an interesting difference in the electrophoretic mobility of

asl-casein in the three types of milk, which quality allows any adulteration of one to be traced with the others.

These differences in the chemical composition of the milk naturally have an effect on the physical and chemical and organoleptic properties of the Feta.

The specifications with which the milk must comply if it is to be used in the production of Feta are as follows:

Origin: the milk must come from one of the following areas: Mainland Greece, Peloponnese, Thessalia, Epirus, Macedonia, Thrace or the prefecture of Lesbos.

Type of milk: pure ewe's milk or a mixture of ewe's and goat's milk in which the latter does not exceed 30% of the total.

Other specifications: the milk must come from breeds of ewes or goats which are reared by traditional methods, using an extensifiable or semi-extensifiable system, are adapted to the area in which the Feta is prepared and basically feed on the flora of the area in question. The fat content of the milk must be at least 6% by weight. The pH of the milk must be at least 6.5. The milk must be made into cheese within 48 hours of milking at the latest. The milk must be kept under controlled temperature conditions until it coagulates. The milk must be full fat and must be milked at least ten days after birth is given.

It is prohibited to condense the milk for cheese or to add powdered or condensed milk, lacto-proteins, casein salts, colourants or preservatives.

E. HISTORICAL FACTS

Feta is the Greek cheese par excellence and has been prepared in Greece since ancient times. It is generally accepted that it is a traditional cheese which was created and developed in Greece, where it has continued to be prepared for centuries, mainly from ewe's milk or from a mixture of ewe's and goat's milk. It is a widely popular cheese and has the largest per capital consumption of any other Greek or foreign cheese available on the Greek market. It is calculated that consumption exceeds 12 kilogrammes per resident per annum (Anyfantakis, 1992). This cheese has always formed a basic part of the diet of the Greek people and is directly related to their customs and their history.

Sheep- and goat-farming have been the main form of dairy livestock farming in Greece since antiquity. This is due to the fact that the geo-physical and climatological conditions make cattle-rearing difficult. There is an wealth of references testifying to the importance of sheep- and goat-farming which date back to ancient times.

The ancient Greeks considered milk a sacred food, because Zeus was fed with milk from the she-goat Amaltheia. Mercury, a God in the ancient Greek dodecatheon, is classified among the pastoral deities and is called "the ram carrier" and "the protector of sheep" (he appeared on ancient statues and coins carrying a ram on his shoulders). Another of his common names was "Tireutir" (the cheese giver, or cheese maker) (Letsas, 1949). Homer (9th century B.C.) makes reference to sheep- and goat-farming in the Odyssey (I, 218) (Sideris, 1982). Reference is also made to professions which were related to sheep farming, such as "sheep sellers" (Aristophanes, The Horses, 132, 138 - Golias, 1989), "dairy farmers" and "dairy cultivators" (Hesychius, Athenaeus, 608a - Golias, 1989), "cheese-makers" or "givers of cheese" (Old Anthology, IX, 744; Compare with Aristotle, The History of Animals III, 521b-522a).

During the Byzantine period also reference is made by F. Koukoulé (1952) to the rearing of sheep and goats, also called "goods" and/or "possessions".

More recently, as stated at the Olympia exhibition of 1875, there were

4,231,139 sheep and goats in Greece, compared with only 51,259 cows and bulls. Sheep- and goat-farming was traditionally open-air: "... the sheep feed day and night and the whole time out of doors..." (Olympia, 1875).

According to Greek mythology, the art of cheese-making was given as a valuable gift to the poor by the Gods of Olympus. Tyro, the daughter of Salmoneas and Alkidiki "... called thus for the whiteness and the softness of her body ..." (Diodoros the Sicilian). Given that sheep- and goat-farming had developed at that time in Greece, ewe's and goat's milk would certainly have been used to prepare cheese. In addition, the reference to

soft white cheese leads us to suppose that cheese was produced at that time using a technique related to that used to prepare Feta.

The cheese prepared by the Cyclops Polyphemos and the ancient Greek livestock farmers was without doubt the forerunner of present-day Feta (Eekhof-Stork, 1976). Homer refers in the Odyssey (I, 218-250) to cheese being prepared from ewe's and goat's milk in a way which constitutes a primitive form of preparation of present-day Feta (Sideris, 1982).

> "So we went inside the cave and had a good look round. There were baskets laden with cheeses, and the folds were thronged with lambs and kids, each class, the firstlings, the summer lambs, and the little ones, being separately penned. All his well-made vessels, the pails and bowls he [Polyphemos] used for milking, were swimming with whey. Then my men convinced me [Odysseus] with their persuasive words to make off with some of the cheeses and set sail.
>
> .....
>
> He [Polyphemos] would curdle half the white milk, gather it all up, and store it in wicker baskets; the remainder he left standing in pails, so that it would be handy at supper-time and when he wanted a drink".

The museum at Delphi houses a cluster which decorated a copper tripod from early ancient times and which depicts Odysseus tied under a ram fleeing the cave of Polyphemos.

References to the presence of cheese in the diet of the ancient Greeks are to be found in numerous texts. Some typical examples are from Athenaeus in the "Deipno [dinner] Sophists":

* "... I advise you to eat bread with cheese because it does children good..." (III.110);

* "... having pressed the cheese well put it in a container..." (XIV.647);

* "... and Tromilikos is a famous cheese... the town of Tromileia in Achaia, around which very sweet goat's cheese is made which cannot be compared with any other, which is known as Tromilikos" (XIV.658);

* "... the pungent cheese is called opia..." (XIV.658);

* "... those Cretans who are tall and plump from the cheese are called effeminate..." (XIV.658).

Friedell (1986), referring to the consumption of dairy products in ancient Greece states that "... goat's cheese is the basic form of food for the poorer population, although the well-off do not despise it ... Ewe's cheese ... was also very common, while the ancients [Greeks] ate cow's cheese least of all".

Later and during the Byzantine period, as F. Koukoulé states (1952), cheese was prepared in a way related to that of Feta. According to F. Koukoulé ewe's and goat's milk was used and "... the soft cheese, which they took care to ensure that it stayed white, was cut into pieces and put with brine

into clay or wooden receptacles which, perhaps then as now, were called talari..."

Reference is made in Epirus and Thessalia in 1815 to the preparation of two types of cheese, of which "... the one with pure, skimmed milk, as they call it there, is fat and tasty to eat ... and both are kept in skins with brine added, and they use them ..." (Papadopoulos, 1815).

In 1825, a price list of foods published in an newspaper referred to the price of "bag cheese and kefalotiri [a type of hard cheese]" (Newspaper of Athens, No. 59, 28th April 1825 - Psylas).

Reference is made in Olympia in 1859 to the prizes awarded to various products exhibited. Reference is made in the cheese products class to the award of the brass medal to "bag cheese". Reference is made in Olympia in 1870 to the award-winning "pouch cheese". The names "bag cheese" and "pouch cheese" refer to the same cheese, which is produced in the same basic way that distinguishes Feta, but which is kept in a bag or pouch and is, in essence, a forerunner of Feta.

The name "Feta" dates back to the time of the Venetian empire in Greece in the 17th century and is probably derived etymologically from the Latin word "fette", which referred to the actual cutting of the cheese into slices for the purpose of putting it into wooden barrels (Delforno, 1980). The name Feta started to spread from the 17th century onwards and, in the 19th century, finally came to mean a cheese which had been prepared, along the same general lines, for centuries in Greece, the origin of which had been lost in the mists of time. The name Feta is synonymous with the English word "slice", the French word "tranche", the Italian word "pezza" and the German word "Schnitte". For the Greek consumer, however, the word "Feta" means a salty cheese in the form of a thick slice, prepared mainly from ewe's milk or from a mixture of ewe's and goat's milk according to a specific technique.

The first written reference to the name Feta is located, according to information to date, in the 19th century, in the shop of the Syrian money-lender Stefanos D. Riga, who purchased Feta for 1.80 drachmas per oka [=

1280 gr] on 23rd April 1892.

The fact that Feta is a Greek cheese is also substantiated by Greek and foreign bibliographies. The following extracts are given by way of example:

* Liabeis (1899) "Feta cheese. Perhaps one of the cheeses most widely circulated by us is Feta cheese, the preparation of which is quite simple and known to all the shepherdesses..."

* Dimitriadis (1900) "The white cheeses are sub-divided into brine cheeses (feta and bag cheese)... This cheese, which is called local cheese or Greek cheese, has been known from ancient times ... this cheese is to be found on the best tables, and its high price and its legendary yield (owing to its

watery preparation) make its preparation more profitable than all other types...".

* Polychronidis (1912) "Feta cheese. Which is known under the name "barrel cheese" is the most widely consumed, it is well prepared, it is very palatable and soft... It is prepared by us on a large scale, so the prices are very satisfactory. Abroad Feta is becoming increasingly popular and is therefore a very profitable and rewarding cheese to produce. This cheese has undergone many and varied changes in its method of preparation from ancient times up to the present day, due to the local climate and the local conditions...".

* Tzouliadis (1936) "The best cheeses in our area (feta, ...) are made from ewe's milk. It is a cheese known from ancient times ... ewe's milk produces the best feta ... The cheese made from ewe's milk (feta, ...) is Greece's finest cheese...".

* Zygouris (1952) "Feta cheese is a soft type of cheese which is Greek par excellence, because it has been prepared in Greece since ancient times and it is today perhaps the cheese most sought after, especially by the residents of mainland Greece... The most suitable milk for preparing Feta is ewe's milk. If necessary a little goat's milk may be added...".

* U.S.D.A. (1953) "Feta cheese is the cheese which is mainly prepared by the livestock farmers in the mountainous areas near Athens in Greece. It is usually prepared from ewe's milk but sometimes from goat's milk...".

* Vondra (1971) "Feta is said to have been first created on the barren hills behind Athens, where the livestock farmers prepare this Greek cheese from ewe's milk and sometimes from goat's milk...".

* Roche and Lambert (1971) "Feta is a soft cheese made from ewe's milk and sometimes from goat's milk...".

* Courtine (1972) "Feta (Greece)... is usually prepared from ewe's milk and sometimes from goat's milk...".

* Eekho-Stork (1976) "Another type of cheese in brine is Feta, which is a cheese of Greek origin made from ewe's milk...";

* Davis (1976) "Feta is a cheese of Greek origin. The best is made from ewe's milk but it can be made from a mixture of ewe's and goat's milk. Feta is the most famous cheese in Greece and is consumed in large quantities...".

N. Zygouris (1952) makes particular interesting references to developments in the production and marketing of Feta, the preparation and consumption of which " due to the difficulty in preserving and transporting this cheese is restricted mainly to the place of production of the milk and to the nearest towns. The cheese is ordered from the livestock farmers and transported

raw in bags to the towns, where part of it is bought by the residents in order to meet the needs of their families and part by the grocers for retail sale. They salt the raw cheese on a table or in a dish and then put it in brine, from which they remove it in pieces each time for the purpose of consumption or sale.

In order to move the cheeses long distances or from the mountain cheese dairies, they used to put it in bags, which were then the only means available for this purpose.

The barrel only began to be used as a means of preserving and moving Feta cheese during the last decade of the 19th century. According to information which we have received from former livestock farmers and cheese merchants, the use of the barrel mainly began once the towns in the hinterland started to grow and once, due to the large-scale development of steam shipping, the means of transportation augmented and the distribution of the white cheese became easier, both at home and abroad. Large quantities of Feta cheese in barrels were then exported to Egypt, especially during the winter months, in order to avoid waste and because, during that period, due the scarcity of cheese, they attained very satisfactory prices. Later, during the last decade of the previous century, large quantities of white cheese were exported in barrels to the United States of America, where they were consumed by the Greeks who had begun migrating at the time to that country in large numbers..."

The raw material traditionally used in the preparation of Feta is ewe's milk or a mixture of ewe's and goat's milk in varying proportions. At times when there was a lack of Feta, a salt cheese was prepared in limited quantities just from cow's milk or from a mixture of cow's and goat's or ewe's milk, which was marketed as Feta, without, however, ever winning the confidence of the public consumer, because it was so inferior in quality to traditional Feta that it hardly deserved the name. Today, with the provisions instituted at national level, in the aim of protecting various traditional products and in order to avoid misleading the consumer, the tendency to use cow's milk in the preparation of Feta has been limited to such an extent that it is no longer a problem.

Traditionally the preparation of cheeses in brine, such as Feta, Domiati and others, was limited to the Mediterranean basin and the Balkans. It is highly probable that these cheeses had the same origin and then diversified by changing the original technique in order to adapt to the soil and climatic conditions and the dietary needs of each area. They have been produced for centuries in small handicraft units, in their countries of

origin, during which time they have developed and their qualities and properties have diversified.

Feta, which is clearly a traditional white Greek cheese in brine, was for many years only known, it may be said, in the Balkan countries neighbouring Greece. These countries also prepared their own salt cheeses from goat's and ewe's milk but always gave them their own names, which are still known today to their consumers, such as Beli-Sir-U-Kriskama or Sprski, Bijeni Sir, Tucani Sir (Yugoslavia), Bjalo, Sirene (Bulgaria), Beynaz Peynir (Turkey) et al. Feta became more widely known thanks to the large-scale immigration of Greeks to various countries, especially during the present century. In countries such as the U.S.A., Canada, Australia, Germany, the United Kingdom et al, large Greek communities grew up, the members of which kept their dietary habits to a large degree. The spread of Feta and the international appraisal which it earned resulted in the opening of new markets for this cheese in various parts of the world, that in turn eventuated in the international trade of this cheese. As large quantities of traditional Feta were not always available in order to satisfy demand, attempts were made to replace it with a cheese in brine prepared from cow's milk. The error in this specific case was not the attempt to substitute traditional Feta with a cheese in brine made from cow's milk but the fact that this cheese was given the name Feta, i.e. the name of a traditional Greek cheese, from which it differed on various counts. In order to reduce the differences between traditional Feta and the cheeses in brine marketed as Feta, chemical substances were added during the cheese-making process in order to whiten the cheese and lipases were added in order to hydrolyse the fat, without, however, its ever achieving the organoleptic properties of Feta.

New cheese markets have grown up over the last 20-25 years in the Middle East. The residents of these countries had a tradition in the consumption of cheeses in brine. Due to the increase in their standard of living and to the reputation enjoyed by Feta on the international market, an international trade grew up which was calculated to meet this demand. As a result, from 1970 onwards, interest in production developed in technologically developed countries, such as Denmark, Germany, the Netherlands et al. These countries, in attempting to promote the new type

of cheese in brine that they were producing from cow's milk, with or without the use of powdered milk, casein salts, casein, or end proteins and using modern methods (ultrafiltration), used the name Feta, which already enjoyed a reputation among consumers, despite the fact that the majority of these products hardly even qualified as cheese in accordance with the standards of the FAO/WHO in force at the time (FAO/WHO, 1973).

From 1970 onwards, ultrafiltration was used even more in the production of cheese. Today, significant quantities of cheese are produced from ultra-

filtered cow's milk and are mainly exported to the countries of the Middle East. The paradox is that these products were also called Feta, despite the fact that they were not, by definition, the same as the traditional cheese (Lawrence, 1987) .

And why all this was going on, the matter of the protection of products made from ewe's and goat's milk was raised at the international seminar on the production and optimization of ewe's and goat's milk held in Athens in 1985. In a vote at the end of the seminar, which was attended by 260 representatives from 17 countries, it was stated that "... measures must be taken in order to promote or introduce an international recognition symbol for all types of milk and their products sold to the consumer and prepared exclusively from ewe's or goat's milk, in order to protect the product and inform the consumer (IDF, 1986).

Greece has always shown an interest in protecting Feta both at home and abroad and this is reflected both in its legislation and in its bilateral agreements and interventions (General State Chemical Laboratory, 1988, Newspaper of the Government of the Kingdom of Greece, 1971). The facility to protect Feta was acknowledged in a letter to that effect by the relevant department of the EEC (Dartix, 1993).

Today, it is necessary more than ever before, within the context of the Single European Market, to stop this commercial "counterfeiting" and to restrict the subsequent financial repercussions which this has on Greek producers. It was in this spirit that the decision of the Council [of Ministers] of the Internal Market of the Community was made on 27th September 1993, to prohibit expressly the use of whitening agents in white cheeses (E 131 Blue patente V, E 140 Chlorophyll, E 141 Chlorophyllins and E 171 Titinium Diozide), a practice which is used in order to give products made from cow's milk a similar colour to those made from ewe's and goat's milk. In addition, the Commission also issued an announcement on 4th August 1993 in which it noted that it had already been decided on 22.12.88 that "Greek legislation which limits the name Feta to cheeses prepared from goat's or ewe's milk does not stand in violation of article 30 of the Treaty of Rome". This consideration, the Commission clarified, was based on the decision of the European Court in the Deserbais case, in accordance

with which "an imported foodstuff may be refused the name which is bears in the member state from which it comes if "it deviates to a significant degree, from the point of view of its composition or preparation, from the products generally known under that name in the Community and consequently cannot be deemed to belong to the same category". The Commission goes on to state in the announcement that it had been decided in 1990, following accusations from various economic factors, to carry out a "long and detailed research" into the application of the Greek legislation, the type

of milk used and possible discrimination against businesses in other countries. The conclusion drawn from the results of the research was that the Greek legislation was "compatible" as far as its objectives were concerned and "was applied" satisfactorily and the Commission closed the file of accusations (Dartix, 1993).

F. PREPARATION TECHNIQUE AND QUALITATIVE PROPERTIES OF THE PRODUCT

I. TECHNIQUE FOR THE PREPARATION OF THE PRODUCT

Traditionally, Feta was produced by livestock farmers using rudimentary equipment and primitive installations. Gradually the situation has changed. Today Feta is prepared for the most part in well-organized and well-equipped cheese dairies on an industrial or semi-industrial scale, although cottage industries still prepare small quantities of the cheese, for self-consumption or for marketing at local level. It is calculated that the production of Feta in Greece now exceeds 70,000 tonnes.

The main features of the preparation of Feta are as follows:

1. **Seasonal production:** this is due to the seasonal production of the milk used to prepare Feta cheese, i.e. ewe's milk or a mixture of ewe's and goat's milk. As a result, the cheese dairies which prepare Feta operate for 6 - 8 months of the year at the most.

2. **Milk collection:** the milk is collected at the cheese diaries once or twice a day, depending on the time of year. During the winter and early spring, because the weather is cold, the milk is collected once a day, while in late spring and summer, when higher temperatures prevail, it is collected twice a day.

3. **Milk for cheese-making:** ewe's milk, the acidity of which must be lower than 0.25% galactic acid (25 oD) and the pH of which must be at least 6.50, is used in order to prepare high-quality Feta. The fat content of the milk delivered to the cheese diaries usually fluctuates between 6.5 and 8% depending on the time of year. In order to ensure that a quality product is produced which complies with legal requirements, the milk used for making the cheese must have a fat content of at least 6.0%.

4. **Heat treatment:** Feta can be prepared both from pasteurised and unpasteurised milk. Despite the fact that Feta prepared from unpasteurised milk has richer organoleptic qualities, there is an

increasing trend towards the use of pasteurised milk, for reasons of public health.

5. **Preparation of the milk:** If the cheese is to be prepared from pasteurised milk, sour milk cultivations and calcium chloride are added. Colourants, preservatives, lacto-proteins, casein salts or condensed or powdered milk are never added.

6. **Coagulating the milk:** traditionally the milk for preparing Feta was coagulated using rennin prepared by the cheese-makers from the abomasum of unweaned lambs and kids. Nowadays this rennin, which is

considered to add to the organoleptic properties of the cheese, is often used together with commercial rennin.

7. **Straining the curd:** this is done without pressure. The curd is roughly divided and then gradually transferred to moulds with a large number of small holes, which are cylindrical in shape if the cheese is to be ripened and preserved in barrels and rectangular if tins are to be used. This stage, during which the biological acidulation of the rennin takes place, is particularly important to the quality of the Feta.

8. **Salting:** the surface of the cheese is salted, using coarse-grained salt, once it has been removed from the mounds and cut up. During this stage an abundant quantity of vegetable micro-organisms develops on the surface of the curd, which will help the ripening process considerably and in will help to develop the special organoleptic properties of Feta cheese.

9. **Ripening:** after the curd has been dry salted and placed in wooden or metal containers, brine containing approximately 7% sodium chloride by weight is added. The containers are placed in ripening chambers under controlled temperature conditions of up to 18°C and at least 85% relative humidity. This ripening stage lasts up to approximately 15 days. The second ripening stage takes place in refrigerated installations where there is a constant temperature of 2-4°C and relative humidity of at least 85% if wooden containers are used. The total time taken for the Feta to ripen lasts at least two months, at which point it is considered to have acquired its rich smell and pleasant taste.

The techniques outlined above are those applied traditionally in the preparation of Feta in small cottage industries throughout Greece, where the work required, is carried out by the members of the family itself. The large cheese dairies however, use modern equipment in order to limit production costs and improve the quality of the product. In such cases, the principles of traditional techniques are always respected, since only then can the qualities of the Feta be safeguarded. Changes regard mainly

the procedures after the curd has been divided, which have been automated to a certain degree. The moulds are filled with the help of gravity from a special port in the cheese kettle while the moulds are moved to a special carrier, where the cheese is strained. The mould is turned out automatically and the curd is cut and salted.

Further information on the techniques used in preparing Feta are given by Anifantakis (1991).

Feta is marketed in wooden or metal drums or is pre-packaged in a material suitable for foodstuffs.

II. QUALITATIVE PROPERTIES OF THE PRODUCT

Feta is a white, rindless cheese ripened and preserved in brine. It is distinguished by a soft to semi-hard structure, with scores and holes of a mechanical nature. Photographs 1 and 2 show barrel and drum Feta respectively, which present the above characteristics. The cheese in brine prepared, for example, with fully ultra-filtered milk cannot acquire these properties. Photograph 3 shows a typical example of the appearance of a cheese in brine made from ultra-filtered cow's milk and marketed as "Feta".

Good quality Feta can be distinguished by its slightly acid and salty taste and its properties of mild lipolysis.

The qualitative properties of Feta cheese are derived mainly from the quality of the raw material used in its preparation (pure ewe's milk or a mixture of ewe's and goat's milk) and the techniques applied.

The average chemical composition of Feta cheese, as ascertained from samples taken from the Greek market is as follows: water content 52.90%, fat 26.17%, total protein 16.71%, lactose 0.17% and sodium chloride 2.94%, with a pH of 4.41 (Vastardis, 1989).

Changes take place in the ingredients of the cheese during ripening which help considerably in allowing the special physical and chemical and organoleptic properties of the final ripe cheese to develop. The caseins hydrolyse into smaller peptides and then into nitrogenous substances of smaller molecular weight (peptides, amino-acids, ammonia et al).

Photographs 4 and 5 show the electrophoretic profiles of the casein and para-k-casein particles respectively of Feta (from ewe's milk) and of cheeses in brine made from pure cow's milk or a mixture of cow's and ewe's milk. Different electrophoretic standards clearly arise, not only in relation to the presence of different casein particles but in their electrophoretic mobility (Vastardis, 1989).

The diagram shows the chromatographic profile (taken with a H.P.L.C.) of Feta (from ewe's milk) and cheese in brine made from cow's milk. The differentiation is also clear here, both from the different peaks and the difference in their size.

The concentration of various nitrogenous particles expressed as a percentage of the total nitrogen of the ripe Feta (60 days) are as follows (Voudouris & Associates, 1986):

Soluble nitrogen	22.54%
Nitrogen dissolved in 12% TCA	11.03%
Nitrogen dissolved in 5% PTA	1.86%

The basic properties of Feta are as follows:

Chemical composition:	
Maximum water content:	56%
Minimum dry fat content:	43%
Type of cheese:	
Consistency:	soft cheese which can be sliced.
Shape:	wedge-shaped or rectangular solid
Dimensions:	various
Weight:	varies
Rind:	none
Cheese mass	
Texture:	compact with some mechanical scoring
Colour:	pure white
Holes:	none or few
Distribution:	throughout the mass
Shape:	unregulated

Other basic features: cheese ripened and preserved in brine for at least two months. It has a lipolytic, palatable, slightly acidic taste and rich smell. The cheese is produced, packaged and ripened in the following areas: Mainland Greece, Peloponnese, Thessalia, Epirus, Macedonia, Thrace and the prefecture of Lesbos. Feta is marketed in wooden or metal drums or is pre-packaged in material suitable for foodstuffs.

G. CONCLUSIONS

The facts set out prove incontestably that:

1. Feta is generally accepted to be a traditional cheese created and developed in Greece, where it has been prepared for centuries from ewe's milk or from a mixture of ewe's and goat's milk. This is confirmed by Greek and foreign bibliographies.

2. Feta has formed and continues to form a basic part of the diet of the Greek people and is directly related to their customs and their history. It is part of their cultural heritage which no-one has the right to deprive them of in any manner whatsoever.

3. To the Greek consumer, who is one of the biggest cheese-eater in the world, Feta cheese means a white cheese in brine, in the form of a thick slice, which is prepared mainly in mountainous areas from ewe's milk from domestic breeds or from a mixture of such milk with goat's milk, likewise from domestic breeds, using traditional techniques. The marketing of any other product under the name Feta misleads the Greek consumer, causes confusion, creates problems in commerce and damages the reputation of the traditional product both at home and abroad.

4. The quality of Feta differs from that of other cheeses in brine now available on the market. It is considered to be the highest quality cheese in brine, which is why its name is often used in order to promote various products produced using different raw materials and techniques.

5. The superior quality of Feta compared with other cheeses in brine is mainly due to the quality of the milk used to make the cheese, the conditions under which the cheese is produced and the experience of Greek cheese-makers. This experience in the production of Feta has been acquired over centuries and has been passed down from generation to generation up to the present day.

6. Many cheeses in brine are available on the market which often, without discrimination, go under the name of Feta. However, these products differ both from each other and from Feta. This fact alone proves the intention to make fraudulent use of a name which enjoys a worthy reputation in the mind of the consumer, in order to promote sales of products which have nothing to do with traditional Feta.

7. Greece has had an unbroken interest in protecting Feta both at home and abroad and this is evident both from Greek legislation and bilateral agreements.

8. It would appear, from the stance that the European Community has taken in one way or another concerning the matter at various times, that it fundamentally accepts Greece's views on the Greekness of Feta and the measures which it has taken to protect it.

9. It is certain that technological developments have permitted and will in the future continue to permit new types of cheese to be produced which differ from classical cheeses. Specifications and names must

be laid down for these cheeses, as this will ensure that the consumer is better informed, as well as avoiding confusion and facilitating both local and international trade.