The market of typical italian cheeses: I. The pecorino romano

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in

Tisserand J.-L. (ed.).
Le lait dans la région méditerranéenne

Paris : CIHEAM
Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 6

1989
pages 205-212

The market of typical italian cheeses. I. The pecorino romano

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ABSTRACT - Pecorino romano is the trade name for one of the most renowned sheep cheeses. Manufactured since the time of the Romans, in the Latium, its production developed in the 19th century in Sardinia, the main production area at present. Production evolves according to socio-economic conditions and varies from year to year with climatic conditions. It is produced either directly by the farmer or by cooperatives or private dairy firms. The evolution of these production structures is discussed in this paper. The cheese is mostly exported to the United States and other countries of the European Community. In recent year, market competition to Pecorino romano in the USA comes from a locally produced cheese and from a «Romano» imported from Argentine.

Key words: Sheep, cheese, production, commercialization.

RESUME - «Le marché de fromages typiques italiens. I. Le pecorino romano». Le Pecorino romano est un fromage de brebis d'appellation d'origine contrôlée parmi les plus réputés. Fabriqué depuis l'époque romaine dans le Latium, c'est au 19ème siècle que sa production s'est développée en Sardaigne qui constitue maintenant le lieu principal de production. La production évolue en fonction des conditions socio-économiques et varie d'une année à l'autre avec les conditions climatiques. Elle est réalisée soit directement par l'éleveur, soit par des coopératives ou des laiteries privées. L'évolution de ces structures de production est discutée dans le rapport. Le fromage est majoritairement exporté vers les Etats-Unis et les autres pays de la Communauté Européene. Ces dernières années, le Pecorino romano est concurrencé aux U. S. A. par un produit de fabrication locale et un «Romano» importé d'Argentine.

Mots-clés: *Ovins, fromage, production, commercialisation.*

Introduction

This report has a twofold objective: the first is to provide an exhaustive, although concise, review of ewe's milk cheese in Italy with a view to make known the problems related to the production, processing and marketing of ewe's milk in Italy to the readers who are not informed of the specific conditions of this sector. The concentration of this activity in one region only i. e. Sardinia, makes the study more interesting and useful to understand the general trend of agricultural economy in that region.

The second objective is to analyze the finished goods market with special reference to foreign markets in order to point out the characteristics of major importing countries and the competitive products and to study any further possibility of expansion of ewe's milk products.

Sardinia, which is the main production area of ewe's milk cheese in Italy, is an interesting example of a Mediterranean area where, sheep husbandry is still made, in most cases, by the traditional free range keeping techniques: manual milking, poor or no livestock buildings, no farm cold stores for milk storage, small-sized sheep flocks (120-170 heads per farm), milk collection, once per day, even over long distances, strong dependence of production on climate etc... This organization is not able to meet the requirements of a modern cheese industry whose milk production should be homogeneous in quality and stable over time.

Sardinia is now facing up to these problems of adaptation to the new market conditions which are even worse due to the present supply surplus.

We hence believe that the Italian experience, in particular that of Sardinia, may be quite interesting also for other Mediterranean countries, especially for North Africa whose technical husbandry characteristics are not so different from those existing in Italy.

General aspects

The Pecorino romano, with the Italian fiore sardo, the French roquefort and the Greek feta, are one of the most famous and widespread sheep's milk cheeses. As indicated by its name, the pecorino romano was not originally produced in Sardinia although most of the national production is obtained there. The technique for its making dates back to Roman times and until the early 19th century it was only produced in Latium. Later on (around 1817) it was spread over Sardinia by some Roman producers as a result of the increased demand from overseas countries (Northern and Southern America).

Pecorino romano is a cheese of controlled origin, catalogued in yearbook «A»[1] of the international convention of Stresa (1951) on the use of designations of origin for cheese (18).

The pecorino romano cheese regulations specify that it may be produced only in Sardinia, Latium and in the province of Grosseto.[2] As provided for in the decree law, the major characteristics distinguishing this cheese are the following: hard, boiled, made entirely from unskimmed fresh ewe's milk curdled with rennet, and cheese making period from November to June (12). It is a table or gratin cheese, cylindrical-shaped, 6 to 22 kg/loaf in weight and an 8 month ripening period. As previously said, Sardinia is the major production area (180.000 quintals in 1987) where 75% of the whole Italian production of pecorino romano is obtained. This concentration of production in Sardinia is related to the spread and the improvement of sheep husbandry techniques which found in that region the optimal conditions for their development, sharply characterizing the Sardinian farming towards pastoralism.

The pecorino romano, whose consumption is practically zero in Sardinia, is the most exported Italian cheese. In 1987 its exported quantity (123.000 quintals) was far higher than that of grana padano and parmigiano reggiano (70.000 quintals).[3]

Structure of production

Besides Sardinia, sheep husbandry is also practiced in other Italian regions, in the South, in hilly or mountain inland areas (Apennines and Alpes) which, due to natural fertility or irregular morphology, are not suitable for intensive farming but where sheep and goats make a beneficial use of available feed. In addition to settlements in marginal areas, sheep husbandry is also practiced in more fertile zones such as some central Northern regions.[4]

The 2nd agricultural census (1970) showed that 53,5 % of sheep stock is reared in hilly areas, 32,8 % in mountain areas and only 12,7 % in lowlands. Comparing these data with those of the last census (1981) it results that each altimetric zone basically keeps the same incidence as in 1970, this gives to sheep husbandry the characteristic of being structurally linked to the areas where pasture is the only possible land utilization and free range keeping is the most common husbandry technique (9).

In the last thirty years the national sheep stock has been first (from 1955 to 1972) characterized by a reduction in number (from 9 million heads to the historical minimum of 7,8 million) and then (from 1972 until today) by an increase up to the present value of 11,5 million. About 50 % of the national sheep stock is dairy stock (5, 6 million); 3 million heads (53 %) are all found in Sardinia where they contribute to the gross marketable regional output by 30 % of total sales of Sardinian farming, involving more than 22,000 operators (1986 data) (14). These few data point out, by themselves, the primary role this sector plays in Sardinian farming; moreover, Sardinia is mostly characterized by upland and hill difficult lands which have been only utilized since ancient times thanks to sheep husbandry. However, husbandry has been increasingly practiced, over the last years, in flat and fertile, even irrigated areas. This shifting towards lowlands is consequent to the decreased yield of mountain pasture due to the abandonment of cereal crop which was grown in rotation with pasture. Moreover, by benefitting from the favourable trend of milk price, sheep husbandry is now competing with other farm products which suffer from a severe crisis and cause every year a reduction of cultivated areas (field crops, sugar-beet, treecrops, etc). This crisis is due to market difficulties, lack of professionalism of agricultural operators, lack of adequate processing facilities etc. (CASU S., 1988 «Il comparto ovicaprino verso gli anni 2000» Gavoi, 8, 9 April) (42).

Breeding techniques

Two breeding techniques were available until the 2nd World War in Sardinia: a) permanent free range keeping which consists in the year-round permanence of flocks in the same grazing areas, and b) migratory herding, that is the continuous shifting of flocks from an area to another as a function of the available feed. This was due to the need for moving animals to more temperate areas which could ensure, all round winter, plenty of pasturable grass.

Traditional pastoral nomadism has now disappeared although, due to land fragmentation, shepherds are often obliged to move flocks so as to exploit both the estate and the lands on lease, located in different areas. This situation which resulted in a nomadic or seminomadic pastoralism was and is still a constraint to land farm investments. In fact grazing lands are usually like bare soils without any basic structure. On the other hand, Sardinian shepherds have always been more concerned with their flocks and their development rather than with land and its improvement PAMPALONI E. (1947). «L'economia agraria della Sardegna» Edizioni italiane, Roma). (46).

The main weakness of this sector, especially as compared to other producing countries (such as France) is the low number of stable farms. Moreover, the technological farm level is still inadequate: only 35 % of them is equipped with livestock houses, machine milking is only practiced in 4.6 % of breeding farms due to their small size and to the insufficient electrification (in 33.5 % of farms); lastly, the high splitting up of estates and the lack of equipped farm centres oblige breeders to shift all the time from a grazing

1. Sanctioned by Presidential Decree (DPR) n.º 1269, d. d. October 30, 1955.

2. Ref. to the annexed table.

3. The two recapitulatory tables relating to pecorino romano and parmigiano reggiano respectively and enclosed to the report, briefly describe the major socio-economic indicators of the two products.

4. Compare the report «Socio-structural and economic features of sheep and goat keeping in Emilia Romagna», Bologna University, 1978, presented by Aragrande M. and Laghi L. to this meeting.

area to another (9). The mean livestock, calculated on a sample of about 700 farms, amounts to 219 ewes (205 in the province of Sassari, 252 in that of Nuoro, 180 in that of Oristano and 190 in the province of Cagliari). This very small size depends on the maximum number of ewes a shepherd can milk manually; the flock number could be further increased by using the milking machine or by setting up associated management farms, where division of labour makes it possible to increase the ewes number per breeder.

Processing structure

The milk production, which was characterized by significant increases until 1986, amounts to 2.5 million quintals although data show a wide variability from year to year. This variability is mainly due to the climatic conditions which cause great variations in the annual productions of grasslands which is the major stock feed. The close dependence of milk production on climate is further confirmed by the 1976-1984 milk mean performance/ewe ranging from 51 litres/head in 1983 to 77 litres/head in 1977.

The share of ewe's milk for fresh consumption is about 8 to 9 % and shows a trend towards a further reduction of its % weight so that nearly the total ewe's milk production becomes cheese. Processing occurs in 3 different processing facilities:

— Social dairies managed by co-operatives.
— Private dairies.
— Direct processing by shepherds.

The milk direct processing is increasingly disappearing. Both pecorino romano and fiore sardo were produced in the past. At present the pecorino romano production has disappeared whereas that of fiore sardo has reduced. Direct production by shepherds is not only related to cultural and traditional customs but to the necessity of processing milk when industrial plants are shut off and of supplying local small-scale markets.

Unlike breeding farms, co-operatives are increasingly developing. The first dairy co-operative was set up in 1907 at Bortigali to oppose the action of manufacturers which imposed a cartel price for milk, independently of breeders. Co-operatives mostly developed in the 50s and 60s more as a consequence of regional promotion measures than of a collective spontaneous awareness of shepherds (15). Co-operative plants for sheep milk processing are about 50 (1987) and are mostly equipped with modern systems. They produce more than 60 % of Sardinian pecorino romano (about 45% of the total national output); about 30% of «toscanello» and semi-boiled cheese and about 10% of «special» and soft cheeses. Processing co-operatives are generally mediumsized plants provided with efficient machinery and equipped for the production and ripening of pecorino romano. The coefficient of utilization of co-operative plants (the ratio of the quantity of processed milk to the quantity of «processable» milk) is low around 60 %. This not only depends on the «physiological» variability of pasture production but also on plant over-sizing.

Private industry facilities, unlike those of co-operatives, are characterized by a wider variability in plant size and by the presence of medium and large-sized processing units. Generally speaking, private enterprises are better organized and more efficient than co-operatives although the latter may greatly benefit from financial aid by the State. Their number is around 40 units and their processing potential is similar to that of co-operatives. According to the data of the Association for Safeguard private dairies produce about 40% of pecorino romano, about 8% of toscanello cheese, 90-95% of soft cheeses and 80% of «canestrato» and strong cheeses.

The increase in the share of milk processed by private enterprises compared to co-operative dairies, over the latest years, indicates a more rapid adaptation of the farmer to the new needs of the market whose trend is towards cheeses of less strong taste, medium hard and soft cheeses.

The pecorino romano production

The available data on ewe's milk cheese production are grouped into two classes; the former provides the pecorino romano yield values: the latter includes, under the wording «other ewe's milk cheeses» all the other types of cheese (soft, medium hard and fresh). The available statistical data show the following; after the first expansion stage, characterized by a high production variability, the production of pecorino romano cheese started decreasing (as a consequence of the 1981, 1982 and 1983 surpluses resulting in a loss in 1984 and 1985). On the contrary, for all other types, especially for soft and fresh cheese, a positive trend started.

This shows, on the one hand, the dynamism of processing facilities towards a higher diversification of finished goods and, on the other, a «passive» adaptation to the changing needs of the market rather than the consequence of a consumption analysis to identify the most demanded cheeses. This was mostly the case of co-operative dairies which were unlikely to diversify the production, their plants being equipped for the production of pecorino romano. Moreover, data show that cheese dairies are still closely dependent on pastoralism. The variability in production, related to the inherent seasonal character of the product, negatively affects the activity of dairies which are obliged to process variable milk quantities (changing from month to month) of poor hygienic standards.

In Sardinia, ewe's milk is, for example, delivered to dairies once per day from December to April and twice per day from May to June. Moreover, the long distance from production to processing areas, the prolonged storage of milk without any refrigeration plant result in hygienic conditions which are inadequate to a proper cheese making. This obviously causes serious problems to dairies as they cannot plan cheese making processes and are then obliged to apply milk heat regulation treatments which are often insufficient to improve quality and directly affect the cheese organoleptic characteristics. (31).

Marketing facilities and control of the product

In order to plan the market policies of co-operatives, a second-degree association was set up in 1966: the «Consorzio Regionale Latterie Sociali Sardegna». Its main task is to coordinate the cheese making processes of associated co-operatives and to market their productions.

The idea of charging a unique association with the marketing of the whole sector of milk breeding co-operatives was a decisive step towards the development of co-operative dairies within the sector of ewe's milk processing in Sardinia. Although this association became operative after 10 years, it has undeniably provided many benefits to the associated co-operatives that have joined the second-degree Association: the 17 remaining ones prefer to draw up contracts of sale with private manufacturers, wholesalers and retailers directly.

At present, the Association controls about 26-30 % of the total production of sheep milk cheese and its activity aims at a higher diversification of finished goods and at concentrating the ripening of semi-boiled, canestrato and curds to a unique centre also charged for marketing. Therefore, a regional centre of dairy products marketing has been set up within the Association; it is charged for all operations subsequent to cheese making. This centre is, however, still under way and is hardly able to be operative.

In conclusion, the marketing of sheep milk cheese is realized in different ways:

1. first-degree co-operatives which sell to intermediary wholesalers who resell in the international markets;

2. second-degree co-operatives (Consorzio Sardegna) which sell both to intermediary wholesalers and in the Italian or international market directly;

3. manufacturers who sell both in the domestic and international market directly.

The latter hold the highest export share and have strengthened their distribution channels abroad. Some enterprises indeed have been exporting to foreign markets for more than 10 years[5]. But all enterprises are not so big as to cover the whole region or to rely on a modern management system of stores outside it such as to ensure their own distribution channels.

Another board which coordinates the marketing stage of both private and co-operative dairies, is the «Consorzio di tutela del pecorino romano». this Safeguard Association, whose action extends to the whole original production areas of pecorino romano (Sardinia, Latium and the province of Grosseto), is mainly based on the three following points:

1. Introduction of the trademark for anti-fraud inspection.

2. Price and revenue protection measures of the whole sector implying annual interventions at the public stockpiling;

3.. Promotion measures.

This Association which has been working since 1981 has introduced an authorized trademark which is sealed on each loaf of pecorino romano cheese. Since 1984, thanks to the financial aid from the Ministry of Agriculture, branding has been extended to all producers although not associated to the «Consorzio», who have to pay 25 % more on branding costs as compared to members[6] (44). The presence of the seal of approval guarantees the observance of the production method, the fat and other components content, as well as the production area.

The market

Within the ewe's milk cheese sector, pecorino romano is characterized by a special market trend as it is the only cheese which is mostly sold in the foreign rather than in the domestic market. This makes difficult a demand analysis to identify the factors of success of this product in the different markets of importing countries. Indeed the EEC events which led to a change of export refunds amounts, the existence of duties and import quotas, the variability of the dollar exchange rate are all factors affecting the volume of exports, thus hiding the actual trend. Although the major market is that of the USA, many EEC countries, including Germany, Holland and Belgium as the most representative, are importers of pecorino romano; moreover, some of them re-export to other countries part of the quantities acquired from Italy.[7]

The export of pecorino romano mostly concerns the «extra» romano, in big size (also a special big loaf produced in the area of Viterbo) but the statistical data we shall refer to also include the fiore sardo which indeed does not account for a significant share of total exports (8-10 %).

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5. The quantity of pecorino romano exported by manufacturers is 85% against 15% exported by co-operative dairies.

6. The Ministry of Agriculture has recently established (1987) the branding costs as 800 ₤/loaf and 1,000 (+25 %) respectively for the members of the Association and for nonmembers.

7. As to this phenomenon which has got increasing importance over the last years, we should refer to some articles recently published in the magazine «Agricoltura informazioni» edited by the «Banco di Sardegna» in which representatives of the Association for Safeguard and of some Sardinian dairies explained this phenomenon as a consequence of the poor or no control from ICE (Institute for Foreign Trade) on the pecorino romano lots being exported from Italy. This could have generated the convenience, for nonmember importers, to supply from other EEC countries where controls are more efficient. Another reason might be related to the slowness of Italian bureaucracy in collecting the refunds from EEC as compared to other EEC countries where these operations are much more rapid.

The pecorino exports recorded many variations but the general trend is positive showing, in 1987, a volume of exports of 123,183 q. which is almost two times the quantity exported in 1980 and about 70 % of the total pecorino romano production.

Volume of exports of pecorino romano in general (q)	
1980	64.776
1981	85.353
1982	75.899
1983	64.690
1984	108.949
1985	136.372
1986	113.279
1987	123.183
Source: Istat, foreign trade	

As far as the countries of destination are concerned, exports are distributed, in the same year, as follows

Major pecorino romano importing countries (1987)	%	
USA		52
EEC		44
of which:		
Holland	49,0	
West Germany	20,0	
Belgium and Lux.	20,0	
France	6,6	
Other European countries		1,4
Other world countries		2,6
Source: Istat, foreign trade		

The US imports which account for more than 50 % of the total, absorbed, on the average, 50.000 q per year, from 1980 to 1987; they are followed by the EEC with 35,000 q per year, on the average, and by other European countries, including Switzerland with an average of 1,356 q. The above mentioned phenomenon (see the footnote in the previous page) was observed within the EEC resulting in a marked increase of imports to Holland, Belgium and West Germany. As to France, the trend is more constant without any rise.

Over the last years, the pecorino romano has encountered increasing difficulties in being sold in the Italian traditional markets and, notably, in North America, due to a gradual change of consumers taste towards cheeses of less distinctive flavour and to an increasingly strong competition of similar products from other countries. In the US markets, for instance, the pecorino romano from Italy has to compete with the «Domestic Romano», a local cheese made from cow's milk and with the «Imported Romano» from Argentine, also made from cow's milk (39).

Many studies confirm that the demand for hard grating cheeses is markedly rigid to both revenue and prices, whereas soft table cheeses are characterized by a higher elasticity of demand to both revenue and prices. The demand for soft cheeses is consequently subject to wider and sudden variations, whereas the demanded quantity of hard cheese follows slower and smaller variations. This is due to the fact that the especific demand for grating cheese is derived and greatly affected by the demand for specific commodities (pastes and other soups) whose rates of increase in consumptions are makedly lower. (38) and (39).

These considerations indicate general guidelines on the market policies for sheep milk products. While for soft cheese a price-policy may be envisaged as a tool to penetrate the market, for hard cheese the only strategy is a policy based on the product quality improvement such as to induce consumers to further distinguish them within the group. At the same time, a «trademark» policy strengthening the product image and ensuring its quality and origin. (28).

Conclusions

The world sheep stock, as described in the first part of this report, is chiefly consisting of meat strains; sheep meat strains are also predominant in the European Community. Breedings in the United Kingdom, where sheep stock is the highest (more than 23 million heads, although the present trend is towards a decrease) are specialized in meat and wool production.

It can hence be stated that Italy, France and Greece are the only countries in the world, excluding some Eastern countries, where sheep husbandry is mainly devoted to milk production. Taking into account that ewe's milk is mostly processed for cheese (lees than 10 % of the total amount is used as fresh milk, it becomes evident that these three countries are the major sheep cheese producers.

There are number of technical, structural and social common problems in France, Greece and Italy as to this type of husbandry. For instance, the areas where grazing is practised is generally typical of hill and mountain lands which are difficult, marginal (following a recent terminology) and have not many production alternatives. Free range or semi-free sheep husbandry, in poor soils, is ofen the only alternative to the abandonment of farms. The obstacles to their intensive utilization are usually related to the pedalogical characteristics hampering the use of agricultural machinery.

Together with these analogies there are significant structural differences. French sheep flocks, although resorting to grazing as the main source of feed, are suplied with larger, consolidated farms, with sheep houses equipped for machine milking and provided with rooms for milk storage. This is not the case in Italy or in Greece where shepherds had to adapt to more difficult conditions with forage unit production. These conditions led in ancient times to the set-up of nomadic or seminomadic pastoralism where shepherds were forced all the time to move their flocks towards more productive grazing areas. This still characterizes the Sardinian rearing where shepherds have no sheep houses and are obliged to move flocks from an area to another due to an excessive farm splitting. These different conditions are the main cause of the varying technical yield levels in France (126 kg. of milk per head), Italy (90 kg.) and Greece (87 kg.) respectively.

In addition to the above mentioned structural problems, the ewe's milk production in Italy and then in Sardinia, is characterized by a high variability related to the varying favourableness of the seasonal patterns. Feedstuffs or creep feedings are seldom used for feeding sheep which will produce milk according to the grass available in grazing areas. Moreover, the lack of on-farm or on-scheme milk storage plants negatively affects the milk quality and results in a wide variability all round the year with the peak production in April. These are the factors which cause the major difficulties for milk processing plants, managed both by single farmers and cooperatives. Indeed, besides the costs for heat regulation to reduce the high microbial content in milk just after delivery, cheese dairies have to bear fixed costs due to over-sizing of plants.

As for the type of cheese produced, the present study has pointed out that the 40 private cheese dairies have characterized the production over the lastest years (1979/1985) towards cheeses other than pecorino romano which still accounts for 50 % of the total processed milk production. On the other hand, the 35 cooperative cheese dairies experienced, over the same period, an increase of the milk production transformed into pecorino romano (from 56.7% to 69.8%) and a reduction for other cheeses (from 43.3% to 30.2%). Private cheese dairies seem to have a more dynamic and elastic production: the consumption of sheep cheese, in the world, is changing towards soft cheese of less strong taste. The pecorino romano has been indeed experiencing a crisis for some years since the market cannot absorb the whole output (since some years they have resorted to AIMA).[8]

In spite of this, the co-operatives —whose indices of plant use are lower than in private farms— paid to their members, a milk price per kg. higher than individual farmers. According to some researchers this is a consequence of the huge financial aid that the «Regione Sardegna» has granted to cooperatives.

However, beyond the political will of the «Regione» a restructuring of milk sheep sector is necessary both for cooperatives and private farms; this implies a reduction in number of processing plants as well as a higher efficiency, even through a differentiation of production towards the most demanded products on the market.

United States and Canada have been for quite a time the major importers of pecorino romano covering about 50 % of the whole production. However, overseas exports show a trend towards stability with moderate annual increases. This may be due, on the one hand, to the strong competition the pecorino romano has to withstand against similar products made of cheaper cow's milk (Domestic Romano and Imported Romano). On the other, we are close to the maturity stage of the product which has been for a time dependent on the consumptions of Italian immigrants abroad. It seems indeed that the new generations are less tied up with the tradition and to the appeal of the typical Italian product so they prefer cheaper cheese. Another significant trend is towards the increase of intra-Community exports to Holland, Belgium and partly to Germany. This is, however, not related to the increase in domestic consumptions of these countries (wich is quite stable) but to an increase in exports towards other countries. This unusual exchange seems to be due to Community «gears». In the countries where bureaucracy is efficient and export refunds are granted quickly (as compared to the Italian slowness) it is advantageous (both for the producer and the exporter) to act as intermediary to export to non-member countries. Moreover, the more efficient sanitary inspections of the above countries guarantee the product from any adulteration, so that it is more viable for foreign importers to take supplies from Holland (for example), rather than directly from Italy, with a better guarantee of a product without any adulteration.

RECAPITULATORY TABLE

Pecorino Romano cheese

a) *Original production areas:*

Sardinia (the whole region)
Latium (the whole region)
Toscany (just the province of Grosseto)

b) *Regulations:* Cheese made entirely of ewe's unskimmed fresh milk, curdled with rennet; produced in the *original production area* in cheese dairies located in the same area in accordance with the local customs; satisfying the requirements and commodities traditional characteristics established by the laws and regulations in force.

c) *Characteristics:* Fat, hard, boiled, compact; it is matured for, at least, 8 months and used as table or grating cheese; tang taste, distinctive flavour, white straw-coloured, clean smoothed rind; cylindrical-shaped with plane faces 14-22 cm high, 6-22 kg in weight; minimum fat content in dry matter = 36%.

d) *Economic data* Surface: 45,796 km^2 (Sardinia 24,089 km^2, Latium 17,203 km^2 and Grosseto 4,404 km^2); Mean hilly area; mediterranean climate with different microclimates due to the orography of the area; farms: 26,000; animal heads: 5,625,800 (average per farm: 216), family farms, 75% of heads belonging to the race from Sardinia; cheese dairies: 33 industrial plants, 33

8. State farm charged to control market prices.

social cooperative dairies (the production of shepherds on their own accounts for 1.5% of the total processed product); 1987 production: 240,000 q (Sardinia 180,000 q. 75% out of the total); 1987 exports: 123,183 q (51.3% of the production).

e) *Control of the product:* Production regulations (a, b, c) market organization: covered by the regulations established by the EEC within the discipline of farm dairy products market (EEC) Reg. n.º 971/68 Safeguard of trademark: «Consorzio per la tutela del percorino romano» set up in 1981. It joins the cheese dairies of the original production area. Its tasks are: control; anti-fraud inspection and surveillance; promotion and self-discipline of production; promotion of consumption.

Bibliographie

1. DE VANNA, M.: «La situazione mondiale degli ovini e dei caprini», *l'Italia agricola, Reda,* gennaio-marzo 1986.

2. SERINO, G.: «Situazione comunitaria degli ovi-caprini», *l'Italia agricola, Reda,* gennaio-marzo 1986.

3. GIULIANI, E.: «L'organizzazione dell'attività selettiva degli ovi-caprini», *l'Italia agricola», Reda,* gennaio-marzo 1986.

4. DE FABRIZIS, C.: «Il comparto ovi-caprino nell'economia agricola italiana: necessità e linee di una politica», *l'Italia agricola, Reda,* gennaio-marzo 1986.

5. DE BERNARDIIS, P.: «La ovinicoltura italiana nel contesto Europeo, Nazionale, Regionale: Sviluppo prospettive certezze». *Relazione all'assemblea generale della Confederazione Nazionale Coltivatori Diretti, Federazione Nazionale Pastori,* Quartu S. Elena (Ca) 1986.

6. PERONE PACIFICO, C.; POLVERINI, F.; CIOFFI, A.; SORRENTINO, A.: *Il settore lattiero-caseario in Italia un'analisi quantitativa,* Inea, Il mulino Bologna, 1980.

7. IDDA, L.: «La pastorizia, in La Sardegna». *Enciclopedia a cura di M. Brigaglia,* Ed. Della, Cagliari, 1982.

8. PULINA, G.; CANNAS, A.: «La pecora Sarda: una razza eccezionale», in *Agricoltura informazioni,* n.º 7-8, Sassari, 1987.

9. AGELLI, M.: «Il sistema Agricolo-Alimentare della Sardegna, i problemi delle zone interne». *Programmazione ed assetto del territorio in Sardegna, Regione Autonoma Della Sardegna».* Assessorato del Bilancio, Cagliari, 1986.

10. IDDA, L.: «Alcune considerazioni sullo sfruttamento zootecnico delle aree estensive della sardegna». *Stratto da Zootecnia e Nutrizione Animali,* Bologna, ottobre-dicembre, 1978.

11. ARANGINO, P.: «Situazione del settore agro-pastorale in Sardegna» *Relazione all'assemblea Federazione Nazionale Pastori,* Quartu S'Elena (Ca), 19-20 marzo 1986.

12. LEDDA, A.; ARRIZZA, S.: «Rilievi sulla tecnologia di produzione del formaggio pecorino romano in Sardegna, Scienza e tecnica lattiero-casearia» *Boll. Ass. Italiana Tecnici del Latte,* La Nazionale Tipografia editrice in Parma, n.º 3, 1969.

13. IDDA, L.: «Aspetti economici della transformazione del latte di pecora in Sardegna, Scienza e tecnica latiero-caseaira» *Boll. Ass. Nazionale Tecnici del Latte,* La Nazionale Tipografia editrice in Parma, n.º 4, 1970.

14. CASU, S.: *Allevamento ovino da latte in Sardegna: Situazione attuale e possibilità di evoluzione.*

15. IDDA, L.; GUTIERREZ, M., USAI, R.: «La Cooperazione nel settore lattiero caseario (Indagine sui caseifici sociali della Sardegna)», *Boll. Interessi Sardi,* Quaderno n.º 13, Camera Commercio Industria, Artigianato e Agricoltura, Sassari, 1984.

16. IDDA, L.: «I Modi per rinnovare l'impresa pastorale», *Agricoltura informazioni,* Sassari, 1982.

17. ROSSI, G.; TRIMARCHI, G.: «Tecnologie della moderna ovinicoltura». *Relazione presentata al 3.º Convegno Nazionale della S.I.P.A.O.C.,* Siena, 22/24 maggio 1979.

18. LEDDA, A.: «Valorizzazione tecnologica della transformazione del latte di pecora e di capra e sue prospettive», *l'Italia agricola, Reda,* gennaio-marzo 1986.

19. IDDA, L.: «Problemi di mercato del latte di pecora e di capra», *l'Italia agricola, Reda,* gennaio-marzo 1986.

20. «Consorzio per la tutela del pecorino romano», *Programma per la produzione del formaggio pecorino romano per la campagna 1987/1988.*

21. PIRAS, B.: «La programmazione delle produzioni e il piano nazionale di settore degli ovini e dei caprini», relazione presentata al convegno su: *L'autodisciplina come strumento di programmazione nella produzione del pecorino romano,* Cagliari, 28 ottobre 1987.

22. LODDO, A.: «Presentazione del piano produttivo del formaggio pecorino romano per la campagna 1987-1988», Relazione presentata al convegno su: *L'autodisciplina come strumento di programmazione nella produzione del pecorino romano,* Cagliari, 28 ottobre 1987.

23. LEDDA, A.: «La produzione in Sardegna di nuovi tipi di formaggio con latte di pecora: problemi e prospettive».

24. LEDDA, A.; MURGIA, A.; ARRIZZA, S.: «Indagine sulla tecnologia di fabbricazione del fiore sardo», relazione presentata alla *giornata di studio su Nuovi aspetti della produzione del formaggio fiore sardo,* Bonassai (Sassari), 31 gennaio 1978.

25. DE CASTRO, P.: «L'Allevamento bovino semi-brado nell'Appenino tosco-emiliano», *Genio Rurale,* n.º 9, settembre 1984.

26. MARRI, F.: *Il mercato del pecorino romano negli Stati Uniti ed in Canada.*

27. PINNA, A.: «Produzione, sviluppo tecnologico e mercato», relazione presentata alla giornata di studio su: *Produzione e commercializzazione dei prodotti lattiero-caseari,* Cagliari, 30 aprile 1986.

28. IDDA, L.: «Situazione del comparto e prospettive di sviluppo dei mercati», relazione presentata alla giornata di studio su: *Produzione e commercializzazione dei prodotti lattiero-caseari,* Cagliari, 30 aprile 1986.

29. MULEDDA, G.: «Valorizzazione e promozione della produzione lattiero casearia», relazione presentata alla giornata di studio su: *Produzione e commercializzazione dei prodotti lattiero caseari,* Cagliari, 30 aprile 1986.

30. CATTE, M.: «Cooperazione, suo impegno nella commercializzazione», relazione presentata alla giornata di studio su: *Produzione e commercializzazione dei prootti lattiero-caseari,* Cagliari, 30 aprile 1986.

31. CASU, S.: «Allevamento ovino e miglioramento della produzione del latte», relazione presentata alla giornata di studio su: *Produzione e commercializzazione dei prodotti lattiero-caseari,* Cagliari, 30 aprile 1986.

32. IDDA, L.: «Valorizzare il pecorino alcuni aspetti della produzione e del mercato del formaggio pecorino prodotto in Sardegna», in *Agricoltura informazioni,* n.º 3, febbraio 1979.

33. MAIONI, F.; PALLAVICINI, G.; TURRI, E., CUPO, C.: «Il mercato lattiero in Italia», *Il Mulino,* Bologna, 1980.

34. LEDDA, A.: «Nuovi tipi di formaggio prodotti con latte di pecora in Sardegna», relazione presentata al convegno sull'allevamento degli ovini. *Produzione e commercializzazione del formaggio pecorino,* Macomer (Nuoro), 2 maggio 1970.

35. IRVAM *informazioni,* «Latte e derivati», n.º 45, 23 dicembre 1987.

36. IRVAM *informazioni,* «Ovini» n.º 1, 13 gennaio 1988.

37. Consorzio per la tutela «del formaggio pecorino romano», *Relazione del consiglio direttivo ai soci,* Macomer (Nuoro), 30 aprile 1988.

38. Rivista *Il vergaro, Il richiamo della Sardegna.*

39. GUADAGNINI, R.: «I fromaggi italiani prodotti di qualità-Si può vendere di più sui mercati comunitari-I mercati extra comunitari-Normativa dei mercati esteri per l'importazione dei prodotti caseari»-*Serie di articoli su Export alimentare,* n.º 8, 9, 10, 11, dei mesi di agosto, settembre, ottobre, novembre, 1987.

40. VALDANI, E.; MAURI, C., e STORER, F.: *Il marketing,* Etas Libri, Milano, 1984.

41. RAVAZZI, G.: *Il marketing nelle aziende commerciali e di servizi, Fendac,* Milano, 1984.

42. CASU, S.: «Il comparto ovi-caprino verso gli anni 2000», *relazione presentata al convegno regionale della Confcoltivatori,* Gavoi (Nuoro) 8-9 aprile 1988.

43. PISCHEDDA, R.: «Il comparto ovi-caprino verso gli anni 2000- le proposte della confcoltivatori», *relazione al convegno regionale della Confcoltivatori,* Gavoi (Nuoro), 8-9 aprile 1988.

44. LODDO, A.: «Programmazione produttiva, diversificazione e commercializzazione dei prodotti lattieri-caseari», *relazione presentata al convegno regionale della Confcoltivatori,* Gavoi, 8-9 aprile 1988.

45. ARAGRANDE, M., e LAGHI, L.: *Caratteri socio-strutturali ed economici dell'allevamento ovi-caprino* in Emilia Romagna, Bologna 1988, ciclostilato.

46. PANPALONI ENZO *Economia agraria della Sardegna,* 1947.