

## **The impact of Ladotyri Mytilinis PDO cheese on the rural development of Lesvos island, Greece**

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Protected designations of origin (PDOs) and protected geographical indications (PGIs) are an important aspect of the recent turn towards quality agri-food products in the EU. However, their actual impact on rural development is not clear. This paper contributes to the debate over the impact of PDOs and PGIs by focusing on Ladotyri Mytilinis PDO, a cheese produced exclusively on Lesvos island, Greece. The socio-economic and environmental impact of Ladotyri Mytilinis PDO is based on findings from two field researches. Secondary data by the National Statistical Service of Greece and by other sources are also used. According to the findings the impact of Ladotyri Mytilinis PDO cheese, and of its various actors that construct its supply chain, is on the one hand very important for Lesvos island but on the other hand not radically different when compared to the impact of Graviera, a close substitute and non-PDO cheese, which is also produced in the area by the same actors.

**Keywords:** protected designation of origin; Ladotyri Mytilinis; Graviera; Lesvos; Greece

### **Geographical indications in the EU and their impact on rural development**

According to the EU, rural development focuses on improving the competitiveness of the agricultural and forestry sector, improving the environment and the countryside, improving the quality of life in rural areas and encouraging diversification of the rural economy (Commission of the European Communities 2005). One path to achieve those rural development goals is quality agri-food products and geographical indications (GIs<sup>1</sup>) in particular. Certified GIs in the EU include protected designations of origin (PDOs) and protected geographical indications (PGIs). For a product to qualify as a PDO, all its steps of production must take place in the delimited geographical area, and the product's characteristics must be exclusively or essentially due to its geographical origin. For PGIs, at least one step of production has to take place in the area, and the link to the area concerned can be justified by reason of a specific quality, reputation or other characteristics linked to the geographical area (Commission of the European Communities 2008). The implementation of the PDO–PGI policy was started in 1992 and it was inspired by former national schemes such as the appellation d'origine contrôlée in France (Folkeson 2005).

Although the EU acknowledges that PDOs and PGIs “make a valuable contribution to sustainable rural development” as they “have an important role to play in the regeneration

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of the countryside since they ensure that agri-foodstuffs are produced in a way that conserves local plant varieties, rewards local people, supports rural diversity and social cohesion” (Commission of the European Communities 2008, p. 12), their exact contribution towards rural development goals is not clear-cut. PDOs and PGIs are associated with various socio-economic and environmental benefits. The link of these products to specific localities can contribute to providing a price premium through the creation of rarity and scarcity (Banks and Bristow 1999, Cañada and Vázquez 2005). PDOs and PGIs are embedded with information, and *if* this is considered valuable by consumers, then they command a price premium (Marsden *et al.* 2000, Renting *et al.* 2003). In many cases, PDOs and PGIs originate in Less Favoured Areas (Parrott *et al.* 2002) and help farmers in those areas to increase their income (Tregear 2003). These products are characterised by great symbolic value (Nygard and Storstad 1998) and in some cases, they can be considered as cultural markers (Belletti and Marescotti 2003). They help to resocialise and respatialise food, especially in the Northern EU countries, but also to preserve the traditional expertise and cultural heritage (Tregear *et al.* 1998) and thus avoid the loss of social and cultural diversity. Food of clear local provenance is often thought to be of a higher quality than anonymous “global” food that comes from nowhere in particular (Murdoch and Miele 1999). Moreover, PDOs and PGIs also contribute to improve environmental sustainability and animal welfare (Tregear 2003), although their exact environmental impact depends on their Codes of Practice.

However, empirical findings indicate that the positive impact of PDOs and PGIs is questionable. Barjolle and Sylvander (2000) indicate that because of the number and complexity of influence indicators, it is difficult to estimate the impact of PDOs and PGIs on rural development. Berard and Marchenay (1998) stress that protection of PDO and PGI products at the EU level has no significant impact on profit, market dominance or added value. According to Belletti and Marescotti (2003), the economic impact of PDOs and PGIs varies from one product to another. The same authors acknowledge that in some regions, PDOs and PGIs are most developed in the economically “advanced” areas (as opposed to the predominance of PDOs and PGIs in the less favoured areas (LFAs)).<sup>2</sup>

Therefore, it is not easy to draw conclusions on the impact of PDOs and PGIs on rural development. Tregear *et al.* (2007) argue that the impacts of territorial qualification schemes at the micro-level have not been examined to a great extent. This paper contributes to the debate over the impact of PDOs and PGIs by focusing, at the micro-level, on Ladotyri Mytilinis PDO, a cheese that is produced exclusively on the island of Lesbos, Greece. The rationale of the paper is to investigate whether the PDO status of Ladotyri can foster rural development on Lesbos island. PDOs and PGIs are under-researched in Greece, and this paper tries to provide an insight to the true potential of those products. The structure of the paper is as follows: the next section focuses on the research method that was followed and on the case study analysis. The penultimate section presents the research findings. Finally, the last section draws some conclusions.

### **Case study: Ladotyri Mytilinis PDO**

There were two reasons behind the selection of Ladotyri Mytilinis PDO as the case study. First, livestock farming and cheese production are very important for the agricultural sector of Lesbos along with olive farming. Moreover, Ladotyri is an emblematic product for the local population with strong cultural connotations. Second, the delimited area of production is an island (Lesbos). The set boundaries of an island make it easier to identify the various actors of the supply chain of Ladotyri but also the flows of raw material and end products.

### **Research methods**

A thorough analysis of the methods that are used for assessing the impact of GIs on rural development is beyond the scope of this paper. Many researchers follow the distinction between economic, social and environmental effects within the sustainable development paradigm (see, for instance, Belletti and Marescotti (2003) and Jahn *et al.* (2005)). Various assessment criteria and indicators of measurement are used and the exercise is to identify the most relevant ones. Some of those indicators provide quantitative data while others qualitative. The impact of GIs on rural development is assessed by measuring (quantitatively or qualitatively) those indicators. However, even quantitative data are meaningless without a point of reference. The product under examination can be observed for a period of time (diachronic method). In this way, a number of indicators (e.g., volume of production, price) are measured and conclusions over the product's evolution over time are drawn. The product can also be compared with a close substitute that is produced in the same area of production (synchronic method). In this way, a number of indicators are compared between the two products and conclusions over the state of the PDO/PGI are drawn (Reviron and Paus 2006).

Based on the existing literature and on the sustainable development triptych, 29 criteria to assess the impact of GIs on rural development have been identified. Some of them (e.g., employment) have a socio-economic impact on the delimited area of production, while others (e.g., use of local resources) have also an environmental impact. Some criteria are easily measured (e.g., employment), while others (e.g., added value) demand complex measurements and more than one indicator. The assessment of the impact for each sustainability aspect is qualitative. The method followed in this paper is mainly a synchronic method. The PDO product (Ladotyri Mytilinis) is compared with a close substitute (Graviera) that is produced in the same area (Lesvos island) by the same actors (livestock producers, cheese-makers). However, the method is also characterised by diachronic elements, as various characteristics of Ladotyri and its supply chain actors are taken into consideration over a period of time. Moreover, the four key parameters (temporal, spatial, demand and associational/institutional evolution) for the study of the dynamic nature of food chains identified by Marsden *et al.* (2000) and Marsden (2003) are used to investigate the evolutionary nature of Ladotyri Mytilinis PDO and its impact on the rural development of Lesvos island. Examining how supply chains are built, shaped and reproduced over time and space is helpful to understand their role and potential in the process of rural development.

The synchronic data was derived from a PhD dissertation (Vakoufaris 2007) that dealt with a number of GI case studies, and their impact on rural development, in the area of the North Aegean Region, Greece. Interviews, with the use of a structured questionnaire, were conducted with the owners of all the cheese-makers that produce Ladotyri Mytilinis PDO or Graviera on Lesvos island. The questionnaires dealt with 11 thematic categories that were based on the 29 identified criteria: data about the owner of the business and the personnel; ability of the business to meet the hygiene standards; know-how and mapping of the exact production process; different products that are produced by the businesses and data about them (e.g., volumes of production) and relations with upstream and downstream actors; distribution networks (e.g., chosen networks and the rationale behind the choice); vertical integration; R&D and entrepreneurship of the business; views of the owners on a possible interprofessional organisation and on the institutional framework; main problems faced by the cheese-makers; management of waste; added value. Quantitative and qualitative data were collected. A total of 17 interviews took place during August 2005–March 2006.

Moreover, interviews were conducted with the personnel of various authorities, which have a direct or indirect link to cheese production (Directorate of Rural Development and Food of Lesvos, Directorate of Commerce of Lesvos, Veterinary Office of Lesvos).

The diachronic data were derived from a previous study (Laboratory for Local and Insular Development 2003) – which was conducted in the North Aegean Region too – that dealt with innovation in the SMEs of the agri-food sector. A total of 14 interviews, using a structured questionnaire, took place with the owners of the cheese-making units during July 2002–September 2002.<sup>3</sup>

Finally, secondary data that deal with the livestock producers or the cheese-makers of Lesvos island are used, in order to clarify certain issues about the evolution of the supply chain of Ladotyri Mytilinis PDO and its impact on rural development. Secondary data from the NSSG but also from the Directorate of Rural Development and Food of Lesvos are used.

### *Case study analysis*

Ladotyri Mytilinis PDO is a yellow hard cheese that is produced using sheep milk (or mixtures with goat milk up to a ratio of 70%/30%). The milk can be either raw or pasteurised. It is produced exclusively on the island of Lesvos, an area of 1639 km<sup>2</sup>. *Ladotyri* literally means *oil cheese* in Greek and the name refers to the technique of preserving the cheese in olive oil. The preservation of the product in olive oil was a common practice until the 1960s–1970s when the spread of refrigerators throughout Lesvos resulted in a radically different product. Nowadays, the preservation of Ladotyri in olive oil is marginal and the “mainstream” product is just covered with paraffin for marketing purposes (easier to transport).

Ladotyri Mytilinis is a PDO product since 1994. The applicant group was the Union of Agricultural Cooperatives of Lesvos, the only second-degree cooperative on Lesvos that represented the livestock farmers. An interprofessional organisation for Ladotyri does not exist. The Code of Practice was based on the production standards of Ladotyri that were established in 1988. Therefore, a “top-down” approach with the main actor being the Ministry of Rural Development and Food was followed. This approach inevitably created problems: the cheese producers have not participated in any way to the formation of the Code; there was no mention of the “traditional” Ladotyri and therefore Ladotyri preserved in olive oil in a sense cannot be considered a PDO product; there is no mention to the farmhouse production of Ladotyri. According to the Code of Practice of Ladotyri Mytilinis PDO (Government Gazette 1994), the milk that is used for its production must come from “sheep and goats traditionally fed and adapted to the area of production. Their diet must be based on the flora of the area”. The rest of the Code describes in detail the production process and the characteristics of the product. No other constraints that can have an effect on the environment exist.

The livestock farmers in Lesvos are organised in 15 first-degree co-operatives. Two of these co-operatives manufacture cheese products, while the rest sell their milk to private-owned cheese-making units. This transaction may happen collectively (the co-operative as a whole) or independently (each livestock farmer on his own). Since no interprofessional organisation exists, all actors in the production chain act independently. As will be explained later on, the livestock producers sell their milk to the cheese-making units but, in a sense, are “cut-off” from the other actors in the supply chain of Ladotyri Mytilinis PDO (but also other PDO and non-PDO cheeses) with the exception of the one co-operative who operates as a cheese-making unit and produces both Ladotyri

and Graviera. There are 21 cheese-making units in Lesvos island and 17 of them produce Ladotyri Mytilinis PDO.

### *Temporal evolution*

The Greek livestock sector is characterised by the predominance of sheep and goat farming over cattle farming. This is also the case for Lesvos island. Table 1 refers to the number of animals and livestock farmers on Lesvos island during 1971–2001. Sheep, goat and cattle farmers decreased by 32.79%, 52.39%, and 63.12%, respectively, during 1971–2001. At the same time there was an increase of 80.70%, 123.49%, and 30.03% in the number of sheep, goats, and cattle.

The increase in the number of animals and decrease in the number of farmers seem to be irrelevant to the PDO recognition in 1994, and unaffected by it, as they are caused by wider EU rural development policies. According to farmers in the area, the reasons behind this increase of livestock animals are (Beopoulos and Vlahos 2004, Iosifides and Politidis 2005) the Common Market Organisation subsidies for sheep and goat meat and the fact that farmers tend to increase their number of animals in order to have an economically viable business. Most farmers keep more animals than the number eligible for subsidy. Another reason is the availability of pastures for purchase or rent. Due to land shortage, when one farmer has the opportunity to buy or rent pastures, he seizes it and consequently increases the size of his/her flock. A final reason is the structural subsidies which serve either as an aid for investments or as an aid for young farmers. For instance, a young farmer in order to take the subsidy must have a flock of at least 100 sheep.

There were 21 cheese-making units operating on Lesvos island in 2005 but also in 2002 (17 of them produced Ladotyri Mytilinis PDO in 2005; 16 of those 17 units produced also Graviera). According to the data provided by the Directorate of Rural Development and Food of Lesvos, there were 24 cheese-making units in 1994. Four of those units shut down during 1994–2001 and one unit started its operation in 1999 (12.5% reduction in the number of units). As far as the production of Ladotyri Mytilinis PDO is concerned, it must be mentioned that there was an increase in its production from 303 tons in 1998 to 626.5 tons in 2005 (an increase of 106.76%). During the same period, the production of Graviera cheese dropped from 956.9 to 696 tons (a decrease of 27.26%). Despite the obvious increase in the demand of Ladotyri, the cheese-makers are skeptical about the impact of the PDO. According to one cheese-maker “the PDO is a positive development but consumers do not recognise it and the State has not ‘protected’ it”. Another cheese-maker mentions that “the PDO status helped increase the production of Ladotyri because it can only take place on Lesvos. In the older days there were other areas that

Table 1. Number of farmers, number of animals (sheep, goats, cattle) and their change during 1971–2001 on Lesvos island.

	Farmers				Animals			
	1971	1991	2001	Change (%) 1971–2001	1971	1991	2001	Change (%) 1971–2001
Sheep	6383	4763	4290	–32.79	167,559	267,132	302,780	+80.70
Goats	8820	5185	4199	–52.39	19,997	31,680	44,693	+123.49
Cattle	1364	428	503	–63.12	5430	4075	7061	+30.03

Source: NSSG.

produced ‘Ladotyri’ such as Limnos island. Now, all that has stopped”. However, six cheese-makers stated that they do not see any real difference due to the PDO label. It seems that most of the cheese-makers are unable to identify the increasing demand for Ladotyri although they have increased its production.

### *Spatial evolution*

Although there have been recorded cases where the delimited area of the PDO changes through time (for instance, Roquefort PDO), this is not the case for Ladotyri. The delimited area has remained exactly the same since 1994. Besides the change in the number of animals and the number of livestock producers and cheese-making units, the only “real” spatial evolution has to do with the area of grazing land, whose share in utilised agricultural area increased from 34.37% to 49.42% between 1991 and 2001 (Table 2). As the numbers of sheep and goats keep increasing so do the grazing lands. Another thing that has to be mentioned is that distant actors (i.e., industrial cheese-making units) can overcome the spatial limits of the PDO by buying-off local actors. In that way, the economic benefits of a strictly local product are reaped by large non-local industrial units. This extraction of value undermines the rural development of the area.

As far as the distributing networks are concerned, there are no significant differences between Ladotyri Mytilinis PDO and Graviera (Figures 1 and 2). Locally, a large part of both products (22.97% in the case of Ladotyri and 20.94% in the case of Graviera) is distributed by the cheese-making units themselves; a typical example of a short food supply chain (SFSC).<sup>4</sup> At the national level, the supermarkets have a prominent role in the distribution of both Ladotyri (44.38%) and Graviera (48.21%), a typical conventional chain. Small quantities of both products are marketed abroad by the cheese-making units or by agents who act as middlemen. Therefore, the cheese-making units use both SFSCs (at the local level) and conventional chains (at the national level) to market their products. There are five cheese-making units who sell their products exclusively on the island of Lesvos. Four of them are very small/family businesses, while the remaining one is a small unit. Four of those units are producers of both Ladotyri and Graviera. Most of the large units sell the majority of their products to extra-local markets through the supermarket chains.

Although there are no quantitative data for the evolution of the distributing networks, one cheese-maker commented that “it is the supermarkets that have the ‘upper hand’ in the trading of our products. Their strength has increased. There was a time when we had 150 customers [meaning that they bought directly from the cheese-maker]. Now the supermarkets take the majority of our production. They squeeze the prices and they have large profit margins. We have to sell to them otherwise we won’t be able to ‘push’ our production to the market. There is a positive side though; when you go to the cashier’s desk to collect the money, it is there [meaning that there are no incidents of dud cheques as when

Table 2. Utilised agricultural area, grazing lands and LU on Lesvos island (1991–2001).

Utilised agricultural area (ha)		Grazing lands (ha)		LUs <sup>5</sup>		LU/hectares of grazing lands	
1991	2001	1991	2001	1991	2001	1991	2001
94,202.2	88,155.1	32,379.6	43,569.4	48,896.8	59,181.9	1.51	1.35

Source: NSSG, own process.

Note: LU = number of cattle \* 1 + number of sheep and goats \* 0.15.

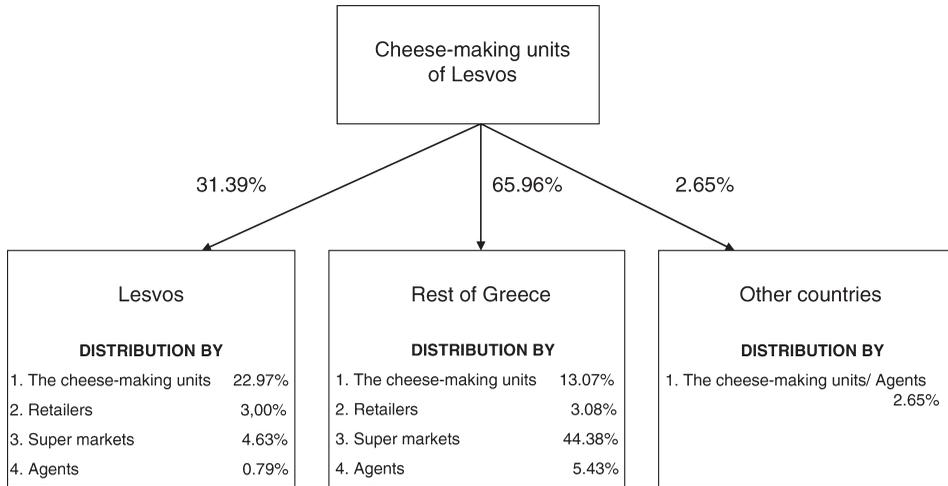


Figure 1. Supply chains of Ladotyri Mytilinis PDO in Greece and abroad.

dealing with other businesses]”. Another cheese-maker mentioned that “there is certainly a squeeze in prices by the supermarkets but through them we can sell larger quantities and the payment is secured”.

*Demand evolution*

As has already been mentioned, the demand for Ladotyri Mytilinis PDO has increased in the period 1998–2005, while the demand for Graviera has decreased. This can be explained by the fact that both products are produced by the same actors (livestock producers and cheese-making units) and they are close substitutes. The increase in the production of Ladotyri Mytilinis PDO shows a consumer preference towards the product, which may be attributed to the growing concern of the consumers over “quality” agro-food products. This increase in production seems to be driven also by the supermarkets (one chain

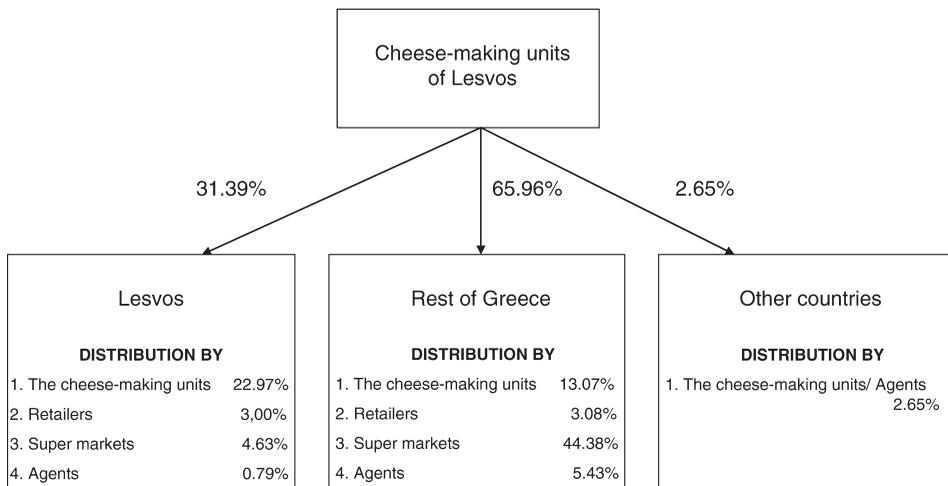


Figure 2. Supply chains of Graviera in Greece and abroad.

promotes the fact that it provides every Greek PDO and PGI) but the cheese-makers seem to not identify it in a conscious manner. One cheese-maker mentions that “at times the market can’t absorb our production. But during the last years the condition stabilised. The consumers turn to local products. However, prices are not stable. A rapid increase in prices ‘turns’ consumers to the imported, cheaper, cheeses”.

#### *Associational/institutional evolution*

The creation of the Organisation for the Certification and Inspection of Agricultural Products (AGROCERT) in 1998 and its growing importance for PDOs and PGIs during the last years is the only institutional evolution worth mentioning. However, the impact of AGROCERT on the actors of the PDO–PGI supply chains is not yet clear.

As far as Ladotyri is concerned, the Union of Consumers of Lesvos does not have a clear picture about the PDO status. Its representatives do not have a good understanding of those products or a specific viewpoint for them. What matters to them is that Ladotyri is a local product, and therefore “less dangerous” when compared with other anonymous industrial products. Moreover, there have been two cases, in the villages of Skolochori and Klio, where associations of the local population opposed the operation of two large cheese-making units due to their insufficient waste treatment. However, this opposition is irrelevant to the PDO and PGI policy.

One last thing that must be mentioned is the decreasing importance of the co-operatives as cheese-makers in the production of Ladotyri Mytilinis PDO. Although there were four co-operatives that produced cheeses in 1998 (two of which produced Ladotyri), there were only two co-operatives in 2005 (and only one of them produced Ladotyri). Nowadays, those other two co-operatives sell their milk and rent their machinery to other cheese-makers who may differ from one year to the other. The inability of the co-operatives to follow a hard policy on those producers that mixed their sheep and goat milk with cow milk or water, and trade their products efficiently resulted in their shutdown as cheese-making units (Vakoufaris *et al.* 2007).

### **Assessing the social, economic and environmental impact**

#### ***The livestock farmers***

The livestock sector on the island of Lesvos is characterised by an increase in the number of animals; grazing lands with a weak vegetation cover (especially in the western part of the island); problems of soil erosion in the grazing lands; the use of fire as a means of clearance of the unwanted vegetation; the use of purchased feedstuff that is bought from other parts of Greece; a decrease in the number of farmers. Table 2 provides information on the grazing land and the number of livestock units (LU) for 1991 and 2001. The increase of the grazing lands gives the false impression that there is an extensification in the livestock sector since the indicator of LU per grazing land area is decreasing. According to Kizos (2003), only seven livestock farmers in a sample of 155 throughout Lesvos island did not use at all purchased feedstuff. This dependence on purchased feedstuff indicates the inability of the grazing lands to cover the needs of the increasing number of animals and this may endanger the production of PDO cheeses such as Ladotyri Mytilinis PDO.

As has already been mentioned, the livestock farmers are “cut-off” from the other actors in the supply chain of Ladotyri Mytilinis PDO. They do not get paid a better price because their milk is used for the production of a PDO product (other indicators such as fat content are used for the differentiation of milk prices. Even this differentiation happens in just a few cheese-making units). In fact, they do not know what really happens to their milk and what kind

of products are produced by it. Therefore, the livestock farmers do not have an economic incentive to produce quality products but also there are no differences in their impact when producing Ladotyri Mytilinis PDO compared with when producing other cheeses.

As far as the prices of the sheep and goat milk are concerned, during 2002 the average price throughout the country was 0.81€/l for the sheep milk and 0.53€/l for the goat milk. The prices for the island of Lesvos were 0.72€/l (11.11% lower than the country's average) and 0.47€/l (11.32% lower), respectively. During 2006, the sheep milk price on Lesvos was 6.02% lower than the country's average (0.86€/l and 0.915€/l, respectively), while the goat milk price was 14.63% lower (0.47€/l and 0.55€/l, respectively). This trend continued in 2008. The sheep milk price on Lesvos was 5.88% lower than the country's average (0.88€/l and 0.935€/l, respectively). The volume of sheep and goat milk production has increased from 24,300 (1997) to 29,600 (2005) tons. However, this increase should be seen under the light of the low milk prices and decreasing profit margins for livestock farmers. According to them, the only way to have a viable income is by increasing the size of their flocks.

To conclude, the production of Ladotyri Mytilinis PDO does not result in a price premium for the milk produced by the livestock farmers of Lesvos island. The prices are the same whether the milk is used for the production of Ladotyri or not. Moreover, the prices are lower than the country's average. However, the sheep and goat milk production has increased during 1997–2005. There is not a difference in the environmental impact between Ladotyri and other cheese products since no constraints are mentioned for livestock farmers in the Code of Practice. Farmers use feedstuff from other areas despite the fact that this is prohibited according to the Code of Practice of Ladotyri Mytilinis PDO. The use of fire as a means of clearance of the unwanted vegetation and the increase in the number of animals results in the declining quality of grazing lands.

### *The cheese-making units*

A common feature of the Greek cheese-making units is that most of the units produce more than one product (e.g., cheeses, yogurt) and more than one cheese. On Lesvos island the cheese-making units produce mostly Feta PDO, Kaseri PDO, Graviera and Ladotyri PDO. Therefore, it is very hard to attribute the *exact* impact that the PDOs, and Ladotyri in specific, have on the economic viability of the cheese-making units.

There was an increase of 33.3% in the permanent and of 3.65% in the seasonal personnel of the cheese-making units that produce Ladotyri Mytilinis PDO between 2002 and 2005. Only two units are co-operatives and only one of them produces Ladotyri. The rest of the units are private enterprises, limited partnerships, general partnerships and public limited companies (Table 3).

The cheese-making units of Lesvos can be categorised as (a) six very small/family businesses (processing less than 170 tons of milk annually); (b) 10 small and medium units (processing more than 170 but less than 1000 tons of milk annually); (c) five large units (processing more than 2000 tons annually). Five of the very small units, seven of the small and medium units and all the large units produce Ladotyri Mytilinis PDO.

As already mentioned, the production of Ladotyri in 2005 was 626.5 tons (14.8% of the total sheep and goat milk production of Lesvos island – 7 kg of sheep and goat milk are needed on average to produce a kilo of both Ladotyri and Graviera) while the production of Graviera was 696.0 tons (16.4% of the milk production) (Table 4). The large units produce 61.48% of the total production of Ladotyri Mytilinis PDO (average figure for the period 2002–2005); the small and medium units produce 33.27% and the very small units only 5.25% of the total production of Ladotyri.

Table 3. Cheese-making units on Lesvos island, legal form of the units, permanent and seasonal personnel in 2002 and 2005.

Cheese-making unit	Legal form	Permanent personnel		Seasonal personnel	
		2005	2002	2005	2002
No. 1	Co-operative	1	1	4	4
No. 2	Private enterprise	–	–	4	4
No. 3	Private enterprise	3	3	2	2
No. 4	Public limited company	2	1	5	3
No. 5	Private enterprise	2	3	1	1
No. 6	Private enterprise	3	1	–	1
No. 7	Private enterprise	3	1	–	1
No. 8	Private enterprise	3	1	–	–
No. 9	Private enterprise	3	3	1	2
No. 10	General partnership	–	–	4	4
No. 11	General partnership	5	2	–	3
No. 12	Limited partnership	3	3	2	2
No. 13	Private enterprise	2	2	–	–
No. 14	Co-operative	3	3	5	6
No. 15	Public limited company	2	2	11	10
No. 16	Private enterprise	3	3	–	–
No. 17	Private enterprise	–	7	–	7
No. 18	Private enterprise	1	4	1	2
No. 19	General partnership	15	3	35	17
No. 20	Public limited company	2	2	6	5
No. 21	Public limited company	4	1	19	23
All units		60	46	100	97
Units producing Ladotyri Mytilinis		52	39	85	82

Focusing on the prices of Ladotyri Mytilinis PDO and Graviera, it is obvious that the cheese-makers do not consider that the PDO product is more qualitative than the non-PDO. Table 5 shows that there are no differences in the wholesale and retail prices between Ladotyri and Graviera for each cheese-making unit. Therefore, the PDO status of Ladotyri Mytilinis is not a sufficient reason, at least for the cheese-makers, to create added value. The differences in prices among the units (up to 1.50€ (from 6.50 to 8.00€) for the wholesale price and up to 0.50€ (from 8.50 to 9.00€) for the retail price) are explained by the differences in their bargaining power and by the differences in the distribution channels. According to one cheese-maker “the prices when we sell at large

Table 4. Production of Ladotyri Mytilinis PDO and Graviera (in kilos) during 2001–2005.

Cheese-making units/year	Ladotyri Mytilinis PDO				Graviera	
	2001–2002	2002–2003	2003–2004	2004–2005	2001–2002	2004–2005
Very small	39,000	17,800	19,500	37,000	29,900	18,500
Small and medium	130,880	219,500	133,800	149,500	179,000	177,500
Large units	288,400	332,700	273,700	440,000	785,000	500,000
Sum	458,280	570,000	427,000	626,500	993,900	696,000

Source: 2002–2003: Laboratory for Local and Insular Development (2003); 2001–2002 and 2003–2004: Directorate of Rural Development and Food of Lesvos; 2004–2005: own research.

Table 5. Wholesale and retail prices (€/kg) for Ladotyri Mytilinis PDO and Graviera cheeses (2005).

Cheese-making unit	Ladotyri PDO		Graviera	
	Wholesale price	Retail price	Wholesale price	Retail price
No. 1	7.70	8.80	7.70	8.80
No. 2	8.00	9.00	8.00	9.00
No. 3	7.80–8.00	8.90	7.80–8.00	8.90
No. 4	n.p.	n.p.	n.p.	n.p.
No. 5	n.a.	8.80	n.a.	8.80
No. 6	7.00–7.30	8.80	7.00–7.30	8.80
No. 7	n.a.	8.80	n.a.	8.80
No. 8	7.60	8.50	7.60	8.50
No. 9	n.p.	n.p.	n.p.	n.p.
No. 10	n.p.	n.p.	n.p.	n.p.
No. 11	7.50	n.a.	7.50	n.a.
No. 12	7.50	8.50	7.50	8.50
No. 13	7.20	8.50	7.20	8.50
No. 14	n.p.	n.p.	n.p.	n.p.
No. 15	n.a.	8.90	n.a.	8.90
No. 16	7.00–7.50	n.a.	7.00–7.50	n.a.
No. 17	6.50	n.a.	6.50	n.a.
No. 18	7.50	n.a.	7.50	n.a.
No. 19	7.50	n.a.	7.50	n.a.
No. 20	7.50	n.a.	7.50	n.a.
No. 21	n.a.	n.a.	n.a.	n.a.

Notes: n.a., not available data; n.p., not produced.

supermarket chains are 0.05–0.10€/kilo lower. But we also have to pay an amount of money for their advertising leaflets”. Another cheese-maker raises this difference in prices up to 0.50€/kg of cheese.

As far as the environmental impact of the cheese-making units is concerned, only seven units have biological wastewater treatment facilities for the processing of their waste. Three of those units are small and medium, while the rest of them are large. Therefore, there is a positive correlation between the size of the units and the existence of the wastewater treatment facilities. Only six of the 17 units (35.2%) that produce Ladotyri treat their waste. According to one cheese-maker “it is prohibited to throw the whey into the wastewater treatment facility. We just use it to treat the wastewater, which is practically unimportant. The only way for us to function and be legitimate is by producing evidence that the whey is taken by pig farmers to feed their animals”. As in the case of livestock farmers, there are no real differences between the environmental impact of Ladotyri Mytilinis PDO and Graviera.

As far as the know-how for the production of Ladotyri is concerned, all the cheese-making units use exclusively pasteurised milk for the production of Ladotyri Mytilinis PDO. As one cheese-maker mentions “if we do not pasteurize the milk then there is a great chance that the cheese will ‘swell’ and thus be non-marketable”. Another cheese-maker adds that “we pasteurize the milk to reduce the bacterial counts”. The cheese-makers do not use own-produced rennet. As one cheese-maker explains “I trust the standardized rennet because I know exactly how much to use for a specific quantity of milk. When experimenting with own-produced rennet you have to identify the coagulation

time and the coagulation capacity, and that's not easy". Seven units produce the "traditional" – preserved in olive oil – Ladotyri in small quantities between 0.2 and 0.5 tons each. The attitudes of the cheese-makers towards the "traditional" Ladotyri are differentiated. One cheese-maker comments that "nowadays 80% of the consumers choose the paraffined product because they are used to it and because it is cheaper. The 'normal' Ladotyri is more expensive and not all consumers identify with it. In Athens all the consumers know as Ladotyri only the paraffined cheese". Another cheese-maker adds that "the paraffined product is better. The production of the 'old' Ladotyri has not stopped because of its quality. If the [wholesale] price of the paraffined product is 7€/kilo then the price of the other is around 10€/kilo". Therefore, the production of "traditional" Ladotyri preserved in olive oil is marginal and only the local population of Lesvos island, or consumers with strong cultural connotations, identify with it.

To sum up, the cheese-making units play an important role in remunerating the sheep and goat milk of Lesvos island. However, there do not seem to be any real differences in the remuneration of Ladotyri Mytilinis PDO and Graviera cheeses. Although Ladotyri is a strictly local product and Graviera is produced in many other parts of Greece, the cheese-makers pose the same value on those close substitute products. There do not seem to be any differences in the environmental impact of the two products. Nothing relevant is mentioned in the Code of Practice of Ladotyri. The environmental impact has more to do with the size of the cheese-making units and the existence of the wastewater treatment facilities.

### ***The distributors***

As already noted, there are no price differences between Ladotyri and Graviera at the cheese-making units' level for both wholesale and retail prices. The only difference in price can be traced to the supermarket chains. There, the prices of Ladotyri Mytilinis PDO are in most cases slightly higher (from 0.13€ up to 0.33€/kg) than the prices of *locally* produced Graviera. But the price of Ladotyri can be higher or lower when compared with the price of Graviera produced in *other* regions of Greece. Different localities are characterised by different prices in close substitute cheeses. Thus, only the supermarkets are getting a price premium for Ladotyri Mytilinis PDO when compared with Graviera produced on Lesvos island. Therefore, the large supermarkets have greater bargaining power. They squeeze the prices gained by the cheese-makers but they also attain the price premium of the end product.

To sum up, the cheese-making units act as wholesalers mostly at the local level, but there is not any price premium in the case of Ladotyri Mytilinis PDO when compared with the case of Graviera. Ladotyri is characterised by a price premium only in the case of the supermarket chains. As far as the distributing networks are concerned, both SFSCs and conventional chains are used by Ladotyri producers. SFSCs are mostly used at the local level, while conventional chains are used to promote the product to extra-local markets. SFSCs offer a face-to-face relationship with the consumers, while conventional chains offer stability in sales and promotion to distant markets.

### **Conclusions – discussion**

This paper tried to identify the socio-economic and environmental impact of Ladotyri Mytilinis PDO, a cheese produced only on Lesvos island, by focusing on a number of key actors in its production chain (livestock producers, cheese-makers, and distributors). A close substitute of Ladotyri, Graviera cheese, that is also produced on Lesvos island by the same actors was used for comparison.

According to the findings there are not any significant differences between the impact of Ladotyri and Graviera. Both livestock producers and the cheese-makers do not get paid a price premium for the production of Ladotyri. Only the supermarkets gain a small price premium. Moreover, the milk prices on Lesvos during 2002–2008 were lower than the country's average. Although the production of Ladotyri has increased and at the same time the production of Graviera has decreased, the cheese-makers seem unable to identify the dynamism of the PDO product. However, the social impact of Ladotyri is important although it is very difficult to allocate it since cheese-makers produce a number of other products. The number of livestock farmers decreased during 1971–2001 but even so the livestock sector is very important for the local economy. The personnel working in the cheese-making units increased during 2002–2005. The absence of an interprofessional organisation for Ladotyri and the inability of the various actors to co-operate are the two reasons behind the inexistence of a price premium. Cheese-makers squeeze the milk prices of the livestock farmers and the large supermarkets put pressure on the cheese-makers. Instead of working together to better defend and remunerate the product, all the actors in the supply chain of Ladotyri Mytilinis PDO act independently. It has to be mentioned that the cheese-makers utilise different distribution channels. The smaller units sell the largest share of their products, if not all, locally through SFSCs. The larger units use both SFSCs and the supermarket chains. Although supermarkets squeeze the prices, they are a necessary evil for the distribution of larger quantities of the products. The cheese-makers, key actors for the remuneration of Ladotyri, price all substitute products in the same manner, and with the same price. For them, Ladotyri and Graviera are both high-quality products and therefore are priced the same, regardless of the PDO sign in the case of Ladotyri. This inability to cooperate or realise the potential of the PDO product, despite its growing demand by the consumers, minimises the socio-economic effects on the rural development of Lesvos.

The environmental impact of Ladotyri is not different when compared with the impact of Graviera. On the one hand, there are not any specific rules on the Ladotyri's Code of Practice that "alter" this impact (apart from indirect rules that deal with the use of locally produced milk by animals whose diet is based on locally produced feedstuff). On the other hand, the same actors produce both products and therefore their environmental impact (e.g., use of fires by the livestock producers, inexistence of wastewater treatment facilities by the cheese-makers) are exactly the same and irrelevant to the production of the PDO product. The livestock farmers try to overcome this squeeze in milk prices by increasing the size of their flocks. This contributes to the desertification problem, especially in the western part of Lesvos. Although the grazing lands form an increasing percentage of the utilised agricultural area, they cannot support the increasing number of animals. As far as the know-how for the production of Ladotyri is concerned, the transformation of the product from a cheese preserved in olive oil to a cheese covered by paraffin for marketing and transporting purposes poses a question identified also by Berard and Marchenay (1988, p. 8): "how can technical and scientific knowledge co-exist with local and traditional knowledge and practices?"

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### Notes

1. GIs, according to the TRIPS Agreement (Art. 22.1), are "indications that identify a good as originating in the territory of a Member, or a region or a locality in that territory, where a

- given quality, reputation or other characteristic of the good is essentially attributable to its geographical origin”.
2. According to Belletti and Marescotti (2003), there are some regions where PDO and PGI products are located mainly in more developed areas. On the other hand, Parrott *et al.* (2002) claim that 70% of those products originate in less favoured areas (LFAs).
  3. Three cheese-makers that produce either Ladotyri Mytilinis PDO or Graviera were not interviewed.
  4. The defining characteristic of an SFSC is the ability to engender some form of connection between consumer and food producer. All SFSCs operate, in part at least, on the principle that the more embedded with information a product becomes, the scarcer it becomes in the market.
  5. This estimation is characterised by a slight statistical error. Cattle of less than two years old should be calculated as contributing 0.8 LU. However, since the NSSG does not provide these data, all cattle were estimated as contributing 1 LU.

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