

The socio-economics of sheep and goat farming in Greece, and the implications for future rural development.

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Summary

The farming of sheep and goats is the most important activity in the animal production sector of Greece, both in terms of employment (about 300,000 families) and overall income (45% of the gross value of animal production). There are 9,200,000 sheep and 5,600,000 goats, of which 95% of the adult females are milked, primarily for cheese production. This paper gives a current overview of the characteristics of the sector in terms of production system, livestock utilised, livestock performance, farm economics, farmers' sociological profile, as well as the processing and marketing sector.

The future implications from continuing the activity of sheep and goat farming in Greece are explored through the study of different scenarios, after examination of the frameworks (E.U., national, regional) within which the sector is operating. It is concluded that this sector will continue to be the engine of the rural economy, continuing to support the existence of the human presence in the LFAs of Greece.

Introduction

Sheep and goat farming in Greece, according to the latest survey is practised on about 300,000 farm units. Counting units with more than 10 adult female animals, this number is about 155,000 farms. The average size of the units with more than 10 animals is 84 sheep and 99 goats. According to the latest census, there are in Greece 9,200,000 sheep and 5,600,000 goats. It is estimated that sheep and goats utilise 10.5 million tonnes of herbage dry matter produced each year on the rough grazings of Greece (Hadjigeorgiou & Papavasiliou, 1998) and contribute 45% of the gross value of animal production, or 15% of the gross value of Greek agricultural production.

These animals belong to dual-purpose breeds (milk and meat). It is characteristic that among European countries, Greece has the highest proportion of milked adult female sheep and goats, approaching 95% of the total. Most of the milk produced by these animals is transformed to cheese in industrial and artisan enterprises. The rest is made into a variety of traditional products, including yoghurts. Meat production is mainly orientated around lambs and goat-kids, which are sold young, at low weights and relatively high prices (Zervas *et al.*, 1999).

The major production system in the sector can be characterised as shepherded-extensive and represents 85% of the total number of animals. Sheep and goats are farmed in all regions of the country and spread more or less evenly. Moreover, since the country is characterised by a mountainous relief and large numbers of islands, the majority (80% of the sheep and 90% of the goats) of the animals are farmed within the LFAs, as defined in Dir. 75/268/EEC.

Brief technical description of the sector

The systems of farming sheep and goats which are practised in the country can be grouped in the following three classes (Kazakopoulos *et al.*, 1998):

a) *Home fed*: A small number of sheep and/or goats of high producing breeds are kept indoors and bred intensively. The animals are fed large quantities of grains and by-products

and limited amounts of forages, and they usually perform above average.

b) *Intensive*: This is mainly a system applied in lowlands, where sheep/goat units are of small to medium size (30-80 head). The animals belong to high performance breeds or local breeds upgraded by cross-breeding and their performance is high. The animals are housed and they usually graze for some hours daily on pastures adjoining the unit. They are fed supplements of concentrates and hay. Sheep energy requirements in this system were estimated to be supplied 53% from grazing and 47% from supplementary feeding of which 41% were concentrates and 6% roughage. The respective values for goats were 73% from grazing and 27% from concentrates.

c) *Extensive with or without transhumance*: This system is applied in the LFAs, and the animal flocks vary in size (100-600 head) consisting of local breeds, whose performance is not always satisfactory. Sheep and goats graze throughout the year, but herbage intake is sufficient to meet the nutritional requirements of these animals only for 3-5 months (March - April to June - July). On an annual basis, it was estimated that concentrates, roughage and grazing contributed 36 %, 26 % and 38 % of total energy requirements respectively for sheep and for goats, 15 %, 2 % and 83 % respectively.

At the accession of Greece to the E.U. in 1981 there were 8,316,000 sheep and 4,623,000 goats while at the same time the numbers of the respective farms were 217,810 and 323,630. The numbers of sheep and goats have increased slightly since then (11% for sheep and 22% for goats) (Table 1), but the numbers of the farm units have fallen dramatically (to 43% of the number in 1981 in the case of sheep and to 51% for goats, see Table 2), due to specialisation and reorganisation of the sector.

Table 1. Population trends of sheep and goats in Greece from 1981-1995 (proportional changes since 1981, %).

	1981	1991	1993	1995
Sheep	100	111.9	109.8	110.7
Goats	100	121.3	116.9	122.1

Source: Ministry of Agriculture, Greece.

Table 2. Changes in the numbers of sheep and goats farms in Greece in the period 1981-1995 (proportional changes since 1981, %).

	1981	1991	1993	1995
Sheep	100	73.7	65.7	57.2
Goats	100	62.6	64.6	49.2

Source: Ministry of Agriculture, Greece.

The change in the quantities of milk and meat produced in the period 1981-1995 followed a slight increasing trend, reflecting the increase in the numbers of animals. However, these changes were not strictly proportional. Sheep meat production increased by 3.8% while goat meat production increased by 17.8 %, due to low meat prices when the competition for sheep meat was strong. On the other hand, sheep and goat milk production increased by 13.6 and 7.0 per cent respectively, due to the relatively high prices for sheeps' milk and the low prices for goats' milk.

Table 3. Changes in production of sheep and goat meat and milk (in tonnes) produced in Greece in the period 1981-1995 (proportional changes since 1981, %).

	1981	1991	1993	1995
Sheep meat	100	103.7	103.3	103.8
Goat meat	100	114.0	117.4	117.7
Sheeps' milk	100	112.2	112.8	113.6
Goats' milk	100	109.5	110.7	107.0

Source: Ministry of Agriculture, Greece.

The populations of sheep and goats are evenly distributed throughout the country, and their distribution is associated with the distribution of the rangeland areas (Table 4). Although a substantial reduction in the number of the nomadic and home-fed animals has been observed in recent years and the nutrition of the animals is largely based on the use of the available rough grazing which represent a large proportion (39.6%) of the total rural land area. Most of this rough grazing area, around 83%, is located in mountainous and semi-mountainous regions and more than half of this (57.5%) belongs to the so-called communal pastures (Polyzos, 1991). However, since the management of the communal pastures is insufficient and their grazing potential unevenly utilised (overgrazing in the lowlands and abandonment of lands on the inaccessible mountainous and semi-mountainous regions), their productivity is declining, at least in the long term.

Table 4. Distribution of sheep and goats by region of Greece as compared with that of the available rangeland areas.

REGION	Rangeland area (%)	Sheep (%)	Goats (%)
Stereia Ellas & Evia	19.01	17.64	18.37
Peloponissos	15.68	15.28	17.94
Ionian islands	2.08	1.41	2.73
Epirus	9.25	9.31	5.98
Thessalia	10.25	16.51	12.02
Makedonia	22.71	15.63	20.39
Thrace	4.75	4.11	5.44
Aegean islands	8.36	5.76	6.64
Crete	7.91	14.35	10.49
Total	100.00	100.00	100.00

Source: Ministry of Agriculture, Greece.

Sheep and goats in Greece are mainly dairy type, but animals are highly variable in their morphology, body size, milking capacity, prolificacy, carcass composition and growth rate. However, these animals have a strong constitution and perfect adaptability to the harsh environmental conditions. The amount of milk produced per animal per year differs between breeds. Variation (Hadjigeorgiou and Papavasiliou, 1998) ranges from 90 to 240 kg for sheep and 100 to 370 kg for goats. The amount of milk produced is a function of the daily milk production and lactation length, both of which vary between breeds. The more productive dairy breeds have a longer lactation period, which ranges between 200 and 230 days, while the average lactation length is between 160 and 180 days.

Socio-economic description of the sector

Economic data on the sheep and goat farms presented in this study are derived from F.A.D.N. (Farm Accounting Data Network) for the years 1989-1995. The present data are averages of 263 farms with a technical-economic specialisation in sheep and 133 farms of a respective specialisation in goats, which for short will be called "sheep farms" and "goat farms" respectively. These farms are all of a size greater than two European Standard Units (E.S.U.), where 2 E.S.U.'s give a Gross Typical Profit of 2,400 Euro. The average size of the sample farms is 21.1 Livestock Units (L.U.) for sheep and 31.9 L.U. for goat farms, where each L.U. is 6.5 sheep or goats. The farms studied represent at the national level 20,133 and 13,343 sheep and goat farms respectively, of a similar specialisation.

The "gross farm income" of the farms specialising in sheep and goats was first compared with that of the "average farm". It was clear that the income of "sheep" and "goat" farms was higher than that of the "average farm". Moreover, the overall trend during the years 1989-1995 was that of stability, when the values were transformed to constant 1990 prices (Table 5). 1 Euro = 328.3 GRD.

The "net farmer and family income" was a second variable compared. This figure was obtained by the subtraction of the "real expenses" (i.e. purchase of production materials, hired labour and depreciation) from the "gross farm income" and is associated with the viability of the unit. The "net farmer and family income" of the sheep and goat farms and that of the average farm is presented in Table 6. The overall trend is a

declining one for all farm types, though “goat” farms have a higher income than “sheep” farms and this in turn is higher than that of the “average farm”. “Goat” farms have a higher net income due to a lower dependence on purchased feedstuffs, since goats are better adapted to utilise the available rangeland areas (Hatziminaoglou *et al.*, 1995). The “net farmer and family income” can plausibly be compared with the “reference income” which is the average of all non-agricultural activities in the country. Therefore, we calculated the “net income” per “Human Labour Unit” employed on “sheep farms” to be 57% of the “reference income”, while for “goat farms” this figure was 66%. The income per unit labour on the “average farm” was 70% of the reference income.

Table 5. “Gross farm income” of “sheep” and “goat” farms and the “average farm” during the period from 1989-1995 (values are in constant 1990 prices in Euro)

	1989	1991	1993	1995
Sheep farms	12,236	11,831	12,498	11,316
Goat farms	12,479	11,203	12,708	11,873
Average farm	10,238	10,509	9,903	10,034

Source: Tsimopoulos *et al.*, (1996) and Tsimopoulos *et al.*, (1998).

Table 6. “Net farmer and family income” of “sheep” and “goat” farms and the “average farm” during the period from 1989-1995 (values are in constant 1990 prices in Euro).

	1989	1991	1993	1995
Sheep farms	7,122	6,613	7,189	6,196
Goat farms	8,367	7,073	8,447	7,530
Average farm	6,086	6,101	5,449	5,605

Source: Tsimopoulos *et al.*, (1996) and Tsimopoulos *et al.*, (1998).

The indicator “gross farm income” over “real expenses and depreciation” during the period 1989-1995 was also explored (Table 7). It was clear that “goat” farms had a higher ratio (this showing as higher returns on given expenses), while “sheep” farms and the “average farm” had similar indicators.

Table 7. The indicator “gross farm income over external expenses” of “sheep” and “goat” farms and the “average farm” during the period 1989-1995.

	1989	1991	1993	1995
Sheep farms	2.4	2.3	2.4	2.2
Goat farms	3.0	2.7	3.0	2.8
Average farm	2.4	2.4	2.2	2.3

Source: Tsimopoulos *et al.*, (1996) and Tsimopoulos *et al.*, (1998).

A second indicator, the “proportion of subsidies in gross farm income” shows the dependence of farm income on subsidies, in the period from 1989-1995 (Table 8). It followed an increasing trend for all types of farms mainly due to decline in “sales income”. This also demonstrates the increasing importance of

the agricultural policies applied (mainly E.U. policies) in supporting the family income in LFAs, and therefore maintaining the existence of human populations in LFAs. However, “sheep” farms appeared to be less dependent on subsidies than the other two farm types. This difference is attributable to the relatively high prices of sheeps’ milk. The proportion of subsidies in “gross farm income” of sheep and goat farms in Greece is low when compared with other cash crops (e.g. tobacco and cotton) and also is among the lowest of all sectors in the E.U. (Tsimopoulos *et al.*, 1996).

Table 8. The indicator “proportion of subsidies on gross farm income” of “sheep” and “goat” farms and the “average farm” during the period 1989-1995.

	1989	1991	1993	1995
Sheep farms	14.7	17.3	19.5	20.5
Goat farms	16.8	15.8	23.9	25.7
Average farm	16.7	19.6	25.9	26.3

Source: Tsimopoulos *et al.*, (1996) and Tsimopoulos *et al.*, (1998).

Table 9. The “gross farm income” components per L.U., of “sheep” and “goat” farms, during the period 1989-1995 (values are in constant 1990 prices in Euro).

Sheep farms	1989	1991	1993	1995
Crop production sales	36.2	28.6	21.6	27.4
Animal production sales	459.3	448.4	468.5	394.2
Subsidies and compensations	98.4	108.4	126.7	112.1
Self-consumption	28.0	30.8	30.5	23.1
Accountant differences	-7.0	-21.3	-19.2	-20.4
Gross Farm Income	615.0	594.6	628.1	536.4
Goat farms	1989	1991	1993	1995
Crop production sales	18.9	16.1	15.8	12.5
Animal production sales	311.6	292.1	323.5	270.2
Subsidies and compensations	78.3	63.7	106.0	96.3
Self-consumption	21.9	20.1	21.3	15.8
Accountant differences	-1.8	-7.0	-30.2	-22.2
Gross Farm Income	428.9	385.0	436.8	372.2

Source: Tsimopoulos *et al.*, (1996) and Tsimopoulos *et al.*, (1998).

The “gross farm income” per L.U. had a similar trend over the period examined for both types of farms (Table 9). However, “sheep” farms had a higher income per L.U. than “goat” farms, though the former depended more on subsidies and

Table 10. Total available workforce (family and hired) (in H.L.U./farm) used in "sheep" and "goat" farming sectors and the average Greek farm classified in three E.S.U. classes (figures are averages of years 1993-1995).

	Total available workforce				Family workforce				Hired workforce			
	2-16	16-40	>40	Mean	2-16	16-40	>40	Mean	2-16	16-40	>40	Mean
Sheep farms	1.80	2.30	2.80	1.87	1.80	2.10	2.80	1.80	0.00	0.20	0.00	0.07
Goat farms	1.73	2.07	3.55	1.87	1.63	1.97	2.10	1.80	0.03	0.13	1.45	0.10
Average farm	1.70	2.10	2.50	1.80	1.60	1.80	1.80	1.60	0.10	0.30	0.70	0.13

Source: Tsimpoukas *et al.*, (1998).

Table 11. Contribution of the family members to the total available, non-paid, family workforce used in "sheep" and "goat" farming sectors and the average Greek farm classified in three E.S.U. classes (figures are averages of years 1993-1995).

	Farmers work/ Total work				Spouse work/ Total work				Member work/Total work			
	2-16	16-40	>40	Mean	2-16	16-40	>40	Mean	2-16	16-40	>40	Mean
Sheep farms	0.556	0.477	0.357	0.556	0.296	0.222	0.286	0.296	0.111	0.238	0.357	0.129
Goat farms	0.613	0.509	0.583	0.557	0.265	0.253	0.142	0.260	0.102	0.169	0.200	0.129
Average farm	0.625	0.556	0.556	0.625	0.250	0.259	0.203	0.271	0.062	0.167	0.203	0.083

Source: Tsimpoukas *et al.*, (1998).

compensations. Moreover, the ratio of the "sheep farm income" over "goat farm income" was 3:2, which was identical to that of the ratio of sheep-milk price to goat-milk price. Both farm types had income which was derived from crop production sales, whereas the self-consumption portion was found to be relatively small.

Another important element of farm economics is the work invested. Table 10 shows the distribution of the available workforce (total, family and hired) on the three classes of farms, according to their economic size (expressed in E.S.U.'s). It is clear that farms are using almost exclusively family labour, allowing a higher "net farmer and family income". Moreover, there is no large difference between "sheep", "goat" and the "average farm" in the proportion of the total contributed by the family workforce. In fact, as enterprises increase in size, so the workforce proportionally increases at a faster rate. This is explained by the fact that sheep and goat farming is practised extensively, and therefore extra workforce is required the larger the units are. There is little interest among sheep and goat farmers in introducing labour-saving machinery or other facilities. The productivity of labour is also affecting the "net farmer and family income". Increases usually occur by increasing the flock size. Furthermore, sheep farms utilise family labour while for goat farms, as size increases, more hired labour is used.

Table 11 shows the distribution of work undertaken on farms by family members, in three classes according to the farm economic size (expressed in E.S.U.). It is evident that the farmer contributes more than 55% of the necessary labour, while the spouse contributes about 30%, and the rest (about 15%) is supplied by other family members. Family member workforce is particularly important for sheep farms and clearly larger than the average, whereas this is more prominent the bigger the units are. The contribution of the farmer is higher on the "average farm" than for the other two comparatives. However, it is evident from Table 12 that "sheep" and "goat" farms require longer hours of work than the "average farm", since the former

requires 101.8 and 105.5% of a Human Labour Unit (H.L.U.) each, while the latter is under 75%.

Table 12. Proportion of the work offered by family members (in relation to the M.W.U.) used in sheep and goat farming sectors and the average Greek farm classified in three E.S.U. classes (figures are averages of years 1993-1995).

	2-16 E.S.U.	16-40 E.S.U.	> 40 E.S.U.	Mean
Sheep farms	101.3	103.3	105.2	101.8
Goat farms	106.4	104.4	124.0	105.5
Average farm	72.4	82.8	86.3	74.9

Source: Tsimpoukas *et al.*, (1998).

The average age of the farm leader is given in Table 13 for the period from 1989 to 1993 and for the three farming types. It appears that the average age of the average farmer and that of the sheep farmer is 50 years, while the goat farmers are 2 years younger than the average farmer.

Table 13. Average age of the farm leader in "sheep" and "goat" farming sectors and the average farm in the period 1989-1993.

	1989	1990	1991	1992	1993
Sheep farms	50.7	48.8	50.8	50.6	50.7
Goat farms	47.6	47.9	47.8	48.4	48.3
Average farm	50.8	49.8	50.4	51.6	50.8

Source: Tsimpoukas *et al.*, (1996).

In a different study (Theodoropoulos, personal communication), where the structure of the sheep and goat farms in the Prefecture of Trikala (an LFA in Central Greece) was explored,

Table 14. Number of cheese-making factories and their average annual production by type of cheese (1988-1994)

	Number of units			Average annual production (tonnes)		
	1988	1991	1994	1988	1991	1994
Soft cheese	794	567	623	85.5	115.1	142.4
Hard cheese	390	275	278	40.5	46.7	45.6
Semi-hard cheese	164	55	56	82.3	138.2	266.1
Whey cheese	412	461	582	14.2	15.7	18.2
Total cheese	939	674	727	110.0	137.9	174.6

Source: Ministry of Agriculture, Greece.

the age of the respective farmers, in a sample of 57, was found to be distributed as follows:

25-29 years of age	5.3 %
30-44 years of age	12.3 %
45-64 years of age	68.5 %
65 and over	14.0 %

In the same sample the education level was found to be distributed as follows:

No school at all	31.6 %
Some years of elementary school	15.8 %
Elementary school	26.3 %
High school (9 years)	12.3 %
High school (12 years)	5.3 %
Technical school (12 years)	7.0 %
Over 12 years of school	1.8 %

The hard working conditions required by the production systems for sheep and goat farming have negative implications for this profession and result in it being considered as “not socially acceptable”. Consequently, the young farmers are reluctant to follow that profession and this is causing a significant problem of succession. In addition, the heads of these farms tend to be ageing, which explains the unwillingness of the sheep and goat farmers to improve their system, especially if no succession prospects exist. According to a survey (Goussios *et al*, 1989), only 20.7 per cent out of a total of 630 livestock holdings had

succession potential, while 36.5 per cent of them did not have any such potential. The rest were uncertain about their succession prospects.

Processing of milk and marketing of cheese.

The processing sector for sheep and goats' milk in Greece is characterised by a large number of cheese-making factories, of small size, and widely distributed. Although the numbers of factories are declining (Table 14), there are still a significant number of them operating in the country. However, these units do not appear competitive on a European level, since the average annual production per unit approaches just 175 tons (Table 14). The distribution of cheese-making factories is associated with the structure and the prevailing production system in the sheep and goat sector. The most important reasons for the development of a large number of small capacity cheese-making factories are the small size of flocks of sheep and goats and their wide dispersal, often in isolated and remote areas, where the pasture lands are located. Moreover, it is estimated that about a third of the cheese produced is made on the farm for home consumption and sale through informal networks.

The fact that these factory units operate periodically (about 6 months per year), since the milking period of sheep and goats lasts 5-6 months, restricts the economic returns of the operation of these enterprises. However, there is a trend towards the reduction of the number of cheese-making factories and the number of the people they employ, and an increase in the average number of employees per unit, as demonstrated in Table 15.

Table 16. The distribution of cheese sales in various shops in the regions of Athens and Thessaloniki.

	Supermarkets	Small Supermarkets	Groceries	Special shop	Producers	Other
Feta	47	2	15	22	12	2
Kasseri	56	3	15	23	1	2
Kefalotyri	54	2	13	25	3	3
Graviera	52	4	10	26	4	4
Edam/Gouda	67	1	7	20	0	5
Special cheeses	68	15	8	8	0	1

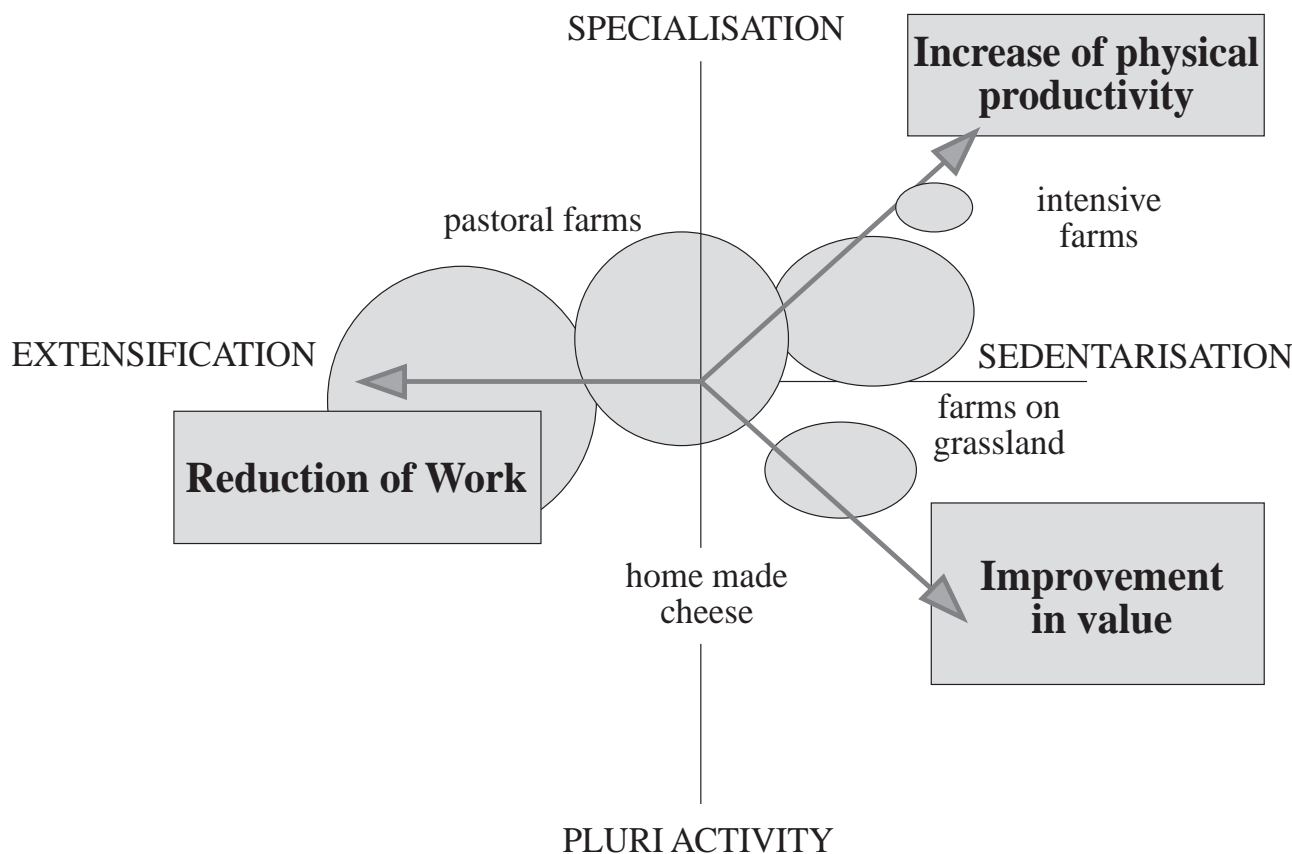


Figure 1. Organization directions of the sheep and goat farming systems.

Table 15. Development of the number of milk-processing units (including cheese-making factories) and their employees in the period of years 1971-1991

	1971	1981	1991
No of milk industry units	1,423	1,160	848
Number of employees	3,228	3,141	2,673
Employed persons per unit	2.3	2.7	3.2

Source: NSSG, Industrial Research

The improvement in transportation conditions during the last decade on the one hand (roads, transportation means) and the creation of large supermarket (S.M.) chains on the other hand, has played an important role in the decrease in cheese units.

According to a survey produced by “Nielsen” and published in the Greek Journal of “Food and Beverages” under the title “Survey of family consumption in the regions of Athens and Thessaloniki”, S.M. accounted for more than 50% of the cheese sales of all types of cheese (see Table 16) with the second most important being the special shops (delicatessens). Moreover, these large S.M. created the need to establish the flow of cheese products at constant quality and volume, demanded large quantities of these products at competitive prices and asking for novel products. These and other demands, at both technical and financial levels, mean that small cheese-making units cannot be sustained for long.

Discussion

The sheep and goat sector in Greece has always had a strong connection with rural areas. This sector has always effectively

utilised the natural resources of the rural areas, including the indigenous vegetation, for the production of valuable goods. However, the level of income from farming of livestock mainly depends on the size of the flock, irrespective of the animal’s productivity (Apostolopoulos & Rogdakis, 1996). Farmers rely more on the increase in the flock size, which results in increasing family income from subsidies and other compensations, rather than increasing production efficiency. On the other hand farmers are more interested in improving labour efficiency rather than making capital investments (Spathis *et al.*, 1998). A strong deterrent against capital investments has also been high interest rates for borrowed capital, sometimes reaching 33% but never less than 15%. During the same period, capital profitability did not exceed 4.6% and 5.7% for sheep and goat farms respectively.

In recent years some of the basic geo-political elements of the past have changed. Moreover, sheep and goat farming is in the process of transformation under the pressure of internal social factors and the global environment. The role of subsidies is shifting under “Agenda 2000” and prices of raw materials and final products are changing due to opening of the global markets. Consumption habits are also changing due to the introduction of new marketing policies and conditions. In our opinion, there are several possible options. Choicis & Vallerand (1996) recognised three possible scenarios for the sector which are schematically presented in Figure 1.

The extensification scenario is the most possible for the mountainous and the marginal areas of the country. In those areas, there is a low population density, low productivity, and a very low level of investment. It is difficult to stimulate the rural economy. The few jobs that can be created will be in the

primary sector. Some of the marginal areas, because of their specific characteristics, may have an advantage over others. These areas may, for example, be near cities, have scenic value or have some infrastructure and because of these the areas have the chance to divert to pluriactivity. In this scenario the income of the rural areas derives from a variety of activities such as the various forms of tourism and the creation of small industries. A variety of jobs in all three sectors of the economy can be supported, and this will sustain an acceptable number of people in an area. The intensification scenario is likely to happen when medium to large industries are established in an area and cultivate the sector mainly towards the production of low-cost products. This model can create infrastructure in an area and a variety of jobs in all sectors of the economy. However, pollution and social degradation problems often are connected with this option. In the case of Greece we can imagine a fourth scenario between the intensification and pluriactivity routes which is based on the differences in the mass of small cheese-making units, which can create development "nuclei" by offering to collect milk for the production of special products.

The issue of rural development is a multidimensional problem. However, it is clear that the primary sector (i.e. agriculture) is a key lever to this direction. Sheep and goat farming is likely to continue to be the driving force to support the existence and livelihoods of human populations in the LFA's.

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