

PN-ANN-208

1/1-3110

Comparative Advantage of Cheese (Queijo da Serra) Produced in The Serra da Estrela Region
of Northern Portugal

PROCALFER

Policy and Economic Studies (PES) Team
Report

by

Roger Fox

December 1983

Submitted by the University of Arizona and Stanford University to USDA/OICD
in accordance with MOU No. 58-319R-3-410.

CONTENTS

	<u>Page</u>
Introduction	1
Cheese Production In the Serra da Estrela	3
Representative System - 1982	9
Appendices-	
I. Budget Sheet	18
II. Additional Cost and Price Data	21.

11

Comparative Advantage of Cheese (Queijo da Serra) Produced in the Serra da Estrela Region of Northern Portugal

Introduction

Cheese from sheep milk produced on farms in the Serra da Estrela region of Northern Portugal is a specialized product that receives continued attention within the panorama of Portuguese agriculture. Part of the attention is due to the rustic, handicraft nature of the production process that until recently was done entirely on the farm. The role of the shepherd and the transhumance nature of sheep production also receive considerable attention. And finally, from the economic and policy perspective, the rapidly rising price of sheep-milk cheese during the past decade attracts interest.

Because of this interest in sheep-milk cheese production, the Policy and Economic Studies (PES) Team of PROCALFER was asked by the Ministry of Agriculture and USAID to include sheep-milk cheese in the study of the comparative advantage of Portuguese agriculture that was initiated in 1982. Since time and resource limitations precluded the inclusion of sheep-milk cheese in the 1982 report, it was added to the 1983 work program of the PES team. Within this context, the current report can be considered as an extension of the 1982 study, increasing the number of systems from 19 to 20. ^{1/}

^{1/} Three additional systems, dealing with milk and cheese production in the Azores also have been studied and reported on in 1983. See Tim Finan, Mark Langworthy, and Tim Josling, Private and Social Profitability in the Azores Dairy Industry, PES Team report to PROCALFER, December, 1983.

Much of the information for this study was gathered during a brief visit to the Serra da Estrela region in September 1983. Additional information was obtained from a number of useful publications.^{2/} The author was accompanied during the visit by Joaquim Domingos Borrego, Luis Gama and Manuela Oliveira, who also provided orientation and assistance before and after the trip. Their cooperation is greatly appreciated.

Since very little is known about the economics of sheep-milk cheese production, one purpose of this study is to provide an initial analysis of one representative system. Much more work needs to be done before a full understanding of the important economic aspects of cheese production can be offered. It is hoped that this study will provide the motivation for more detailed studies that investigate alternative systems and consider the dynamics of existing systems.

^{2/} Joaquim Domingos Borrego, Situação Actual da Ovinicultura Portuguesa Série Técnica, Nº 1, Direcção - Geral de Extensao Rural, Direcção de Serviços de Produção Animal, Lisboa, Junho de 1980; Policarpo Armando de Lima Teixeira de Sá e Eduardo Manuel Mota, Aleitamento Artificial de Borregos - Ensaio Experimental, Série Técnica, Nº 2, Direcção - Geral de Extensao Rural, Direcção de Serviços de Produção Animal, Lisboa, Junho de 1980; Ministério da Agricultura, Comercio e Pescas, Gabinete de Planeamento, PMA - Relatorios Subsectoriais, 18 - Ovinos e Caprinos de Leite and 19 - Ovinos e Caprinos de Carne, Abril, 1983; Alberto Trindade Martinho, O Pastorio e O Queijo da Serra, Coleção Parques Naturais, Nº 3, Parque Natural da Serra da Estrela, Lisboa, 1978; Alberto Trindade Martinho, O Queijo da Serra, Comissão de Coordenação da Região Centro, Coimbra, 1980 and Inocencio Seita Coelho, Economia dos Sistemas Agro-pastoris na Serra da Estrela, Caderno Nº 4, Instituto Nacional de Investigação Agrária, Departamento de Estudos de Economia e Sociologia Agrárias, Julho 1982.

Since there are no government economic policies directed specifically at sheep-milk cheese, the evaluation of policies in this study is concerned more with general agricultural policies that affect the farm sector. Additionally, the results of the study could be useful for the discussion and evaluation of specific new policies that influence the profitability of cheese production and other products from sheep production in the Serra da Estrela region.

Cheese Production in the Serra da Estrela

Sheep milk for the production of cheese largely comes from small herds located in the valleys and mountains of the Serra da Estrela region. These herds often contain a mixture of sheep and goats, although there is tendency to specialize in one or the other type of animal. A study conducted in 1979/80 found that 21 percent of the herd owners had less than eleven sheep and goats. The modal class was 21-40 animals (32.2 percent), and only nine percent of the 3034 herd owners interviewed had more than 60 animals (Martinho, 1980, p. 47).

The most common race of sheep found in the region is the Bordaleiro - Serra da Estrela, which appears in both white and black species. These sheep are well-known for their milk production and commonly produce more than 100 kg of milk per lactation (Sobral, 1978). In comparison the white Merino sheep, common to the Alentejo, produces only 18-20 kg of milk per lactation.

The number of sheep and goats in the Serra region has tended to decrease in recent years. Data presented by Martinho (1978, p. 30) show that the total number of sheep and goats in six major concelhos of the Serra declined from 63,335 in 1940 to 29,321. Most of the decline occurred after 1955. Martinho attributes this decline to three principal factors: (1) prohibition on and penalties for grazing sheep and goats on certain reforested areas; (2) the brucellosis campaign that greatly reduced the number of goats; and (3) the exodus of young people in search of better paying jobs within and outside of Portugal. The decline appears to have been greater for goats than sheep.

Transhumance, as practiced in the region, also has declined. Traditionally, two forms of transhumance were common. During the winter months from November to March or April, sheep and goats from the higher mountain areas would be taken to the lowlands by shepherds. Pastures were rented from local farmers and the cheese making process, traditionally done during the winter months, was conducted in very rustic, usually temporary facilities. During the summer months, small herds of sheep and goats owned by the lowland farmers were joined together in larger herds that spent the summer on rented mountain pastures. Sheep and goats owned by mountain residents also returned to the mountain villages and pastures during the summer months.

According to Martinho (1978, pp. 47-69), both types of transhumance have declined, the distances travelled have reduced greatly, and the

living conditions of the shepherd and his family who practice transhumance have improved. The number of sheep and goats that transhumed in one mountain village, Sabugueiro, declined from about 10,000 in 1955 to slightly over 3,000 in 1977 (Martinho, 1978, p. 65). At the same time the number of shepherds practicing transhumance declined from 65 to 29. In spite of this decline, Martinho's data show that in 1978, 60 percent of the herd owners interviewed still practiced transhumance (1978, p. 42).

Several types of cheese are produced in the Serra da Estrela region. Cheese produced entirely from sheep milk, known as "queijo da serra", generally brings the best price. Some queijo da serra may contain small amounts of goat milk. Cheese made from a mixture of sheep milk and goat or cow milk is called queijo "tipo serra" -- serra type cheese. There do not seem to be any clear cut standards to distinguish between the pure and the mixed product. Furthermore, there is considerable within-type variation because of the different methods of processing and handling the cheese. A third type of cheese called "queijo fresco" -- fresh cheese -- is also made from sheep milk. It is processed daily and sold immediately. This study deals primarily with queijo da serra (sheep-milk cheese).

Interestingly, not all sheep owners in the Serra da Estrela region make cheese. Martinho's data for 618 producers show that 51 percent made cheese in 1978, 10 percent sold milk, and 39 percent neither sold milk nor made cheese. Herd owners with small herds had a smaller proportion making cheese (Martinho, 1978, p. 71). Martinho attributes this to the higher proportion of goats in the small herds.

In recent years, the price of sheep-milk cheese has increased dramatically. Coelho, using data from Martinho, presents the following average prices for the cheese market (feira) at Fornos de Algodres (Coelho, p. 36):

<u>Year</u>	<u>Esc/15 kg (arroba)</u>	<u>% Change</u>
1973	1000	34.3
1974	1343	13.6
1975	1525	26.3
1977	1925	35.5
1978	2608	

Prices for 1982 were reported to the author as being in the Esc. 6750 to 7500 per arroba (15 kg) range. Thus the 1982 price was about seven times greater than in 1973 and about 2.7 times greater than the 1978 price. These rapid price increases have renewed interest in the production of sheep-milk cheese. Martinho reports that returning emigrants and others are investing in sheep because of the high expected profits. There is also one modern processing plant in the region that buys sheep milk and produces only sheep-milk cheese.

Producers of sheep-milk cheese have three principal alternatives for selling their product: (1) directly to the public, (2) to itinerant buyers who come to their property, and (3) at the local cheese fairs that are normally held bi-weekly during the cheese making season. Martinho's survey data indicate that each of the three outlets is used with about the same frequency (1978, p. 73). However, producers who live considerable distances from the cheese

fairs, rely on direct sales and the itinerant buyers.

Milk and cheese are not the only products from the sheep herds in the Serra da Estrela. Lambs are often sold at a young age in order to increase the amount of milk available for cheese production. Lambs weighting 8-12 kgs are frequently sold, whereas in the Alentejo, where meat production is the primary activity, lambs are sold at 25 kg. Concern over the slaughter of young lambs and the potential for higher profits has led to research and some experiments with artificial feeding of lambs (Sá and Mota, 1980). Lambs are taken from the ewes within two days of birth and fed a fortified, substitute milk. The ewe's milk thus becomes available for cheese making, and the lambs can be kept for longer periods. However, extra labor and care are required and certain investments must be made.

Wool is also obtained from the adult sheep, usually about two kilograms per year. Cull ewes and rams are sold or slaughtered for household consumption. Finally, another type of cheese, called requeijão, is produced from the whey that is a by-product of making queijo da serra. Requeijão is ready to eat the same day it is made. It is generally consumed within the Serra da Estrela region. All of the products mentioned above will be treated in the representative system.

A recent report by the Ministry of Agriculture summarizes the official perspective on the problems facing the sheep and goat industry in Portugal (1983, Ovinos e Caprinos de Leite, pp. 39-45). Although some of the problems cited in the report may not exist in the Serra da Estrela region, it is important and useful to understand the Ministry's evaluation.

1. Structural and human resource problems.

Land ownership patterns have resulted in small and fragmented farms unsuited for sheep and goat production. Herds are poorly managed because of the low levels of education and training of the managers, including shepherds.

There is a shortage of trained technicians to work on improving productivity.

2. Financial policies.

Public sector support of the sheep and goat industry has been inadequate. Interest on credit is too high and repayment periods too short. Subsidies for major improvements have been almost nonexistent.

3. Legislation.

Legislation regarding hunting and the control of loose (wild) dogs is harmful to sheep and goat producers. The protection of rabbits and their consumption of pasture is cited as one example of inappropriate legislation.

4. Research and Experimentation.

Reduction in research activity has limited the development of knowledge about the potentialities of existing herds. The strengths and weaknesses of indigenous races are not well known. Specific mention is made of the need to increase support for improvement of sheep in the Serra da Estrela region.

5. Producer Organizations.

The lack of effective producer organizations limits the ability of the government to provide technical support and to develop appropriate policies and programs. The only producers' organization currently active is the Association of Sheep Producers from the Serra da Estrela. It is a new organization that still needs guidance and support.

Representative System - 1982

Information from a variety of sources was combined to form a representative sheep system for the Serra da Estrela. This system provides the basis for the economic analyses that follow.

The system is based on the home production of cheese from a herd of 40 sheep, not counting lambs. The assumed herd size is somewhat larger than the regional average of 30 sheep (Martinho, 1980, p. 45). Feed is assumed to be produced from native pasture and rye grass (hay). Pasture and hay are used as proxies for the actual feeding system, which includes a lot of grazing and browsing of various plants and shrubs.

Technical aspects of the system are:

1. Herd composition

32 ewes

2 rams

6 replacement ewes

32 lambs (36 births - 4 deaths)

- 2. Fertility - 0.90
- 3. Fecundity - 1.25 Thus 36 ewes x 0.90 x 1.25 = 36 births.

4. Mortality

Adults - 4%

Lambs - 10%

5. Replacement rates

Ewes - 19% (from herd)

Rams - 20% (purchased)

6. Feed requirements

Animal feed requirements are based on 380 forage units (U.F.) per ewe. That is, 380 UF per year per ewe will feed adequately the ewes, rams, replacement ewes, and lambs in a herd with the above composition (see MACP-GP, Ovinos e Caprinos de Leite, 1983, p. 28). Thus 32 ewes x 380 UF = 12,160 UF per year for the herd.

7. Feed production

To provide an opportunity cost type of measure of feed production, the following simplified production system was specified to meet the feed requirement of 12,160 UF per year.

	<u>(ha)</u>	<u>(kg/ha)</u>	<u>(kg)</u>	<u>(UF/kg)</u>	<u>(UF)</u>
Native pasture	20	5,000	100,000	0.11	11,000
Rye hay	2	2,600	5,200	0.30	<u>1,560</u>
					12,560

A herd of the above composition and technical characteristics is expected to produce the following outputs per year:

1. Milk available for cheese production
 - 100 liters/ewe in lactation
 - 32 ewes x 0.90 fertility = 29 ewes in lactation
 - 29 x 100 = 2,900 liters of milk
2. Cheese
 - 5.5 liters/kg of cheese
 - 2,900 ÷ 5.5 = 527 kg of cheese
3. Whey cheese (requeijão)
 - 2 units/kg of cheese
 - 527 x 2 = 1,054 units of whey cheese
4. Lambs
 - 32 - 6 for replacement = 26 lambs sold at 12 kg live weight.
5. Cull animals
 - ewes - 6
 - rams - 0.4
6. Wool
 - 2 kg/adult animal
 - 34 x 2 = 68 kg of wool

In order to determine the value of output, 1982 prices were used.

The representative 1982 prices selected for the analysis are:

- milk Esc 50\$/l (not sold)
- cheese Esc 450\$/kg
- Whey cheese (requeijão) Esc 35\$/unit

Wool Esc 115\$/kg
 Lambs Esc 250\$/kg live weight
 cull ewes 45 kg live weight -- Esc 3,000\$ each
 cull rams 60 kg live weight - Esc 4,000\$ each

Given the above prices and output, the total value of annual output (sales) is:

		(%)
Cheese - 527 kg x 450\$/kg =	237,150\$	62
Whey cheese - 1054 units x 35\$/unit	36,890\$	10
Wool - 68 kg x 115\$/kg =	7,820\$	2
Lambs - 26 lambs x 3000\$ =	78,000\$	21
Cull ewes - 6 ewes X 3000\$ =	18,000\$	5
Cull rams - 0.4 x 4000\$ =	<u>1,600\$</u>	<u>*</u>
Total =	379,460\$	100

*Less than 0.5%

Cheese is clearly the most important product of the system, accounting for the 72 percent of the output value when whey cheese is included. The second most important product is lambs. This is in contrast to the Alentejo sheep system, analyzed last year, in which lamb sales represented 58 percent of the value of output (PES Team, Comparative Advantage, p. 208).

The annual private and social costs of maintaining the representative herd and producing cheese are summarized in Table 1. A more detailed breakdown of the costs is provided on the budget sheet contained in the Appendix I. Private and social costs of direct labor are assumed to be equal because in the Serra da Estrela region, social security and health taxes are rarely paid to rural laborers. In cases where

Table 1. Private and Social Costs of Sheep-Milk Cheese Production,
Serra da Estrela, Portugal, 1982.^{1/}

Item	Private Cost	Social Cost
	(Esc)	
1. Direct Labor		
Shepherd	144,000	144,000
Assistant Shepherd	60,000	60,000
Cheese Maker	<u>27,000</u>	<u>27,000</u>
Total	231,000	231,000
2. Intermediate Inputs ^{2/}		
Feed (pasture & hay)	82,332	109,363
Other	<u>19,710</u>	<u>19,430</u>
Total	102,042	128,793
3. Fixed Inputs	22,383	51,463
4. Total Costs	355,425	411,256

^{1/} Annual costs for the representative herd discussed in the text, including the cost of making cheese. See Appendix I budget table for details.

^{2/} Includes embodied land, labor and capital of tradable inputs.

these taxes are paid, private costs of labor would be from 20 to 25 percent higher.

Direct labor represents the major cost item in raising sheep and making cheese: 65 percent of total private costs and 56 percent of total social costs. If unpaid family labor is used for tending the sheep and making cheese, as is frequently the case, then the 231 contos for direct labor reflects the alternative cost of hiring labor to perform the same tasks.

Feed that is produced on the farm represents the major intermediate input item. Other intermediate inputs include veterinary care, shearing, replacement rams, and fuel (wood). The difference between the private and social costs of intermediate inputs is largely due to the subsidies on fertilizer and capital used to produce the pasture and hay. Social (world) prices of fertilizer were about 75 percent higher than what Portuguese farmers paid for fertilizer in 1981/82.

The social cost of fixed inputs is considerably higher than the private costs. This difference reflects the cost of capital which was fixed at two percent in real terms for agricultural borrowers, whereas the real social cost of capital was estimated at eight percent (see Ch. 7, Comparative Advantage and, 1982).

As can be seen by comparing the total private costs from Table 1 with the value of output previously given in the text, the representative system was profitable under 1982 conditions. Additional profitability estimates are given in Table 2.

Table 2. Private and Social Profitability of Sheep-
Milk Cheese Production, Serra da Estrela,
Portugal, 1982. ^{1/}

Item	Private	Social
		(Esc)
Total Costs	355,425	411,256
Total Returns	379,460	368,920
Profits (+) or Loses (-)	24,035	-42,336

^{1/} Annual costs and returns for the representative herd discussed in the text, including the cost of making cheese. See Appendix I budget table for details.

Private profits of the system are about 24 contos or six percent of total returns. This rate of profit appears reasonable given the assumptions of the analysis and the proxy method for estimating pasture and hay costs that probably overestimated actual feed costs. Since large amounts of family labor are involved in the system and since this labor has been evaluated at its opportunity cost, the total returns to family labor and management, including profits, could be on the order of 200-250 contos per year depending upon the amount of hired labor actually employed.

When considered in social terms, the system is unprofitable (Table 2). As explained above, total social costs are greater than total private costs because of the subsidies inherent in the system. Also contributing to the negative returns is the fact that the social price of queijo da serra of Esc 430/kg is less than the private price of Esc 450/kg. Thus, total social returns are less than total private returns and a loss of about 42 contos or 11.5 percent is indicated for the system.

The lower social price for sheep-milk cheese suggests that Portuguese consumers are being taxed by having to pay more for the domestic product than for an equivalent imported product. However, before a definitive statement on this point can be made, further investigation of the facts is needed.

Three areas need to be studied. First, the calculation of the social price of sheep-milk cheese using the Italian price needs to be verified. (See the Appendix II for the method used to calculate the social price.) If imports of Italian sheep-milk cheese actually

occurred in 1982, a simple method of verifying the price would be to obtain the average c.i.f. import price for 1982. If such import prices do not exist, then the components of the estimated price need to be verified. That is, the f.o.b. Italian price and the shipping charges need to be verified. An important aspect of looking at the Italian f.o.b. price is to determine if subsidies are involved that negate its value as a world or social price.

Second, the tariff rate on imported sheep-milk cheese needs to be studied as it will reveal the government's tax policy on the product. The effects of the government's policy can then be estimated as was done for other products in the 1982 report. Also, if quotas are utilized, they need to be quantified.

Third, more knowledge about the relative quality of Portuguese sheep-milk cheese and Italian sheep-milk cheese is required. The private and social price differential may be due to important quality differences unknown to the author.

A final aspect of the analysis that needs to be done is to investigate the EEC price policy for sheep-milk cheese so that the constrained profitability analysis used in the 1982 report can be applied. With sufficient information, social and private profitability estimates and the effects of policy until 1990 can be obtained.

Appendix I - Budget Sheet

Appendix II - Additional Cost and Price Data

Additional Cost and Price Data

1. Annual depreciation and interest (d & i) on fixed inputs:

	<u>Acq Price</u>	<u>Salv Value</u>	<u>Life Years</u>	<u>d & i 8%</u>	<u>d & i 2%</u>
1 ram	20,000	4,000	5	4,320	3,475
Sheep shed	50,000	10,000	20	4,874	2,646
Cheese making room	20,000	4,000	20	1,949	1,059
Cheese making equip.	5,000	-0-	5	1,252	1,061

2. Value of herd for calculation of annual interest.

32 ewes @ 15,000 =	480,000
6 replacements @ 6,000 =	<u>36,000</u>
	516,000

$$516,000 \div 2 \times i$$

For i = 2%, 5,160\$/yr.

For i = 8%, 20,640\$/yr.

3. World price for Sheep-milk cheese.

Data from U.S. agricultural trade statistics.^{1/} TSUSA commodity code 1176500 - Sheep milk cheese - loaves - grating. U.S. imports:

	<u>MT</u>	<u>Val (\$1000)^{2/}</u>	<u>\$/kg</u>
1980 Total	5,112	18,508	3.62
Italy	4,184	15,934	3.81
1981 Total	5,843	23,534	4.03
Italy	5,282	21,912	4.15
1982 Total	6,105	29,392	4.81
Italy	5,703	28,018	4.91

^{1/} USDA, Economic Research Service, U.S. Foreign Agricultural Trade Statistical Report, Calendar Year 1981 & 1982.

^{2/} The import value is defined as the "customs value", based on the foreign market value, export value or constructed value, and excludes import duties, freight, insurance and other charges incurred in moving the commodity to U.S. ports.

Most U.S. imports come from Italy (80-90 percent). Use the 1982 Italy price plus 10 percent for freight, insurance and unloading to represent a Lisbon c.i.f. price of \$5.40. The 1982 escudo/\$ exchange rate was 79.473, thus the escudo price in Lisbon is Esc 429\$/kg. Shipping charges within Portugal are very low, about 1\$32/kg for shipments from Lisbon to the Serra da Estrela region. Thus, Italian sheep milk cheese delivered to the Serra cost about Esc 430\$/kg in 1982.