Patterns of rural labor utilization in northwest Portugal

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Patterns of rural labor utilization in northwest Portugal

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The University of Arizona, 1988

PATTERNS OF RURAL LABOR UTILIZATION

IN NORTHWEST PORTUGAL

by

Maria Henrique Serejo de Moura Pinheiro

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A Thesis Submitted to the Faculty of the

DEPARTMENT OF AGRICULTURAL ECONOMICS

In Partial Fulfillment of the Requirements
For the Degree of

MASTER OF SCIENCE

In the Graduate College

THE UNIVERSITY OF ARIZONA

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DEDICATORIA

Aos muito queridos, minha mae Maria de

Fatima e meu marido Joao Rui

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ABSTRACT

This study evaluates some possible agricultural household responses to changes in output prices due to Portugal's entry into the EC. The patterns of interest were, continuing expansion in farming, continuing part-time farming and leaving farming.

Farm accounts were used to model different farm types and evaluate their farm returns. Simulations were performed, using different technologies, levels of family labor availability, and land area.

The results show that part-time farming is a viable alternative in the northwest region and that there are strong economic incentives for traditional farms to specialize and adopt more modern technologies. The dairy system exhibits the highest returns. Traditional farms that do not have some available fixed family labor will face pressures to leave farming; but since family labor with low opportunity cost is more available on the small traditional farms, farm size is not expected to expand rapidly because leaving farming is not likely to take place in such a great way.

For structural changes to take place, it is necessary that training and education programs be introduced that parallel improvements in the nonagricultural sector in such a way that larger amounts of agricultural labor can be absorbed.

CHAPTER ONE

INTRODUCTION

Northwest Portugal, a region that includes a flat narrow zone along the Atlantic Ocean, a transitional zone and a mountainous zone cut by wide valleys in the interior, comprises two administrative regions, Beira Litoral and Entre Douro e Minho (map 1). The Northwest accounts for about 17% of Portugal's land area and for 43% of its population (Finan,1987). About 35% of northwest inhabitants live on farms and nearly 20% of the economically active population works in agriculture.

Entre Douro e Minho with its three districts Porto, and Viana do Castelo in the coastal zone and Braga in the transitional zone will be the geographical focus of this study. This region has a population density of about 317 inhabitants per square kilometer (Damiao, 1987). The economically active population is concentrated in the coastal and transitional zones. More than 14% of the active population works in agriculture (table 1).

Table 1

Total active and agricultural active population in the

Entre Douro e Minho - 1981

Total Population Number	Total Active Number	% of total	Total Agric. Active Number	% of active
2,772,562	1,102,767	40	158,672	14.4

Source: Damiao, 1987

Since 1960, the Portuguese working population grew more quickly than the total population (Ramos and Costa, 1982). Comparing the evolution of the active population with the total employment, the former has grown more rapidly. However in periods of high rates of migration from rural to urban geographical regions and abroad, as had been observed until 1975, the results do not conform to the trend. Employment growth had been insufficient to absorb the availability of the work force.
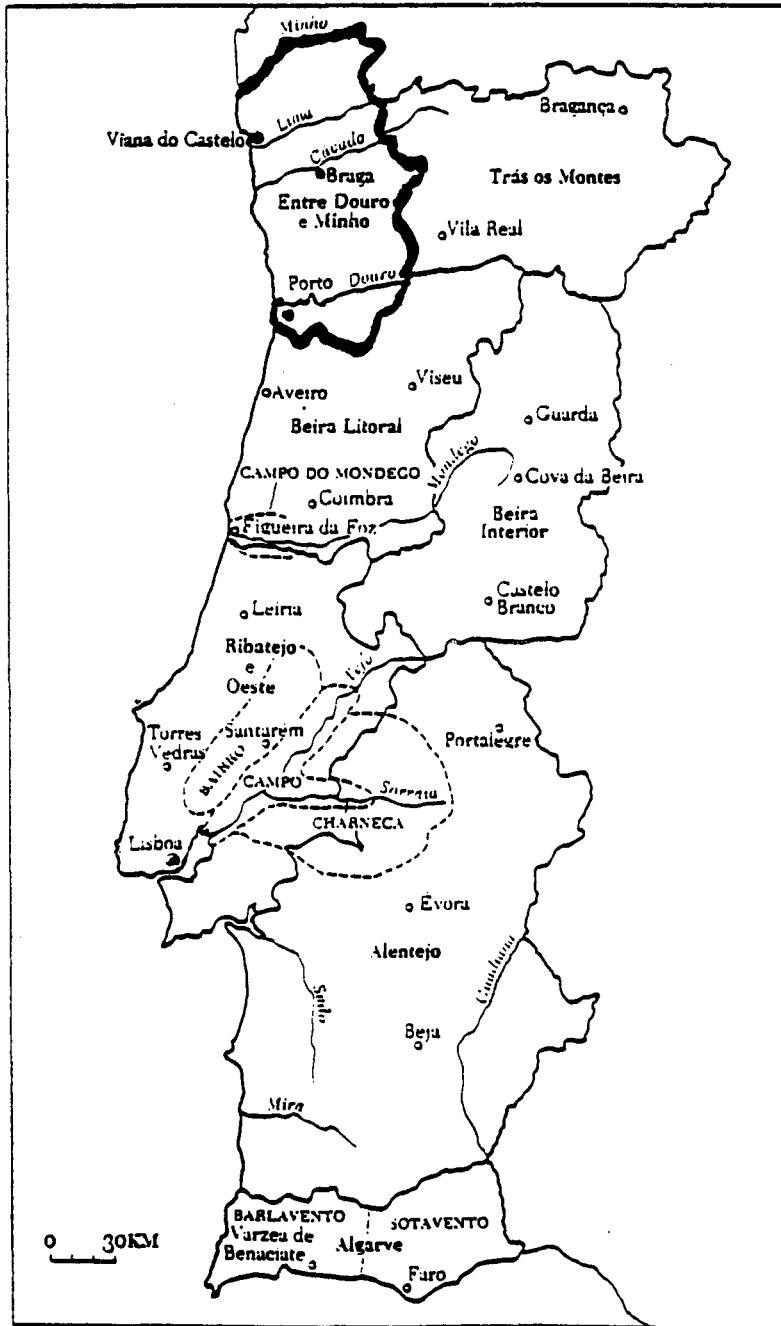
MAP 1. *Regions of Portugal*

The share of the agricultural sector in the national labor force during 1960-1979 declined sharply in the course of growth. In spite of the slight decrease in labor force in the agricultural sector, the proportion of labor in comparison with the rest of western Europe, is however very high (Langworthy,1987). Table 2 shows changes in agricultural employment in Entre Douro e Minho in the period 1969 - 1979. These estimates show that in general a decline in the share of active population in agriculture has been taking place although it still remains much higher than in the EC.

Table 2

Structural changes in Entre Douro e Minho

districts, 1968 - 1979

District	Number of farms		Active Population in Agric.	
	1968	1979	1968	1979
Porto	86,700	54,600	16,0921	152,938
Viana	43,900	41,900	115,598	118,874
Braga	63,700	55,200	183,517	175,090
Total	194,300	151,700	460,036	446,902

Source: Finan, Fox and Langworthy, "Characteristics of Northwest Portuguese Farming System", 1987

The agricultural sector is characterized by small fragmented farms, using predominantly family labor. Non-specialized farm systems using mainly family labor and producing diversified crop and livestock activities for home consumption predominate in the region.

The Entre Douro e Minho (EDM) has relatively high yields in comparison with the country as a whole although still low by EC standards (table 3). However the EDM accounts for about 13.2% of the national agricultural GNP, with the livestock activity being the greatest contributer, followed by crops (Damiao, 1987). The very small farms, with an average of 0.85 hectares per farm, account for about 80% of the farms in the region. Table 3 suggests that improvements in technologies will be needed if Portuguese agriculture is to be competitive with other EC producers. Such changes imply a continuation of the structural shift of labor out of the agricultural sector. This process can only occur smoothly if nonagricultural employment opportunities are available to absorb the labor moving out of the agricultural sector.

Table 3

Average yields of Entre Douro e Minho, Portugal and the EC, 1986

Products	Units	Entre Douro e Minho	Portugal	EC
potatoes	Kg/ha	17,146	7,890	26,800
milk	Liter/cow	3,145	2,433	4,258
wine	Liter/ha	13,354	3,600	6,700

Source: Damiao, 1987

With respect to agricultural, the employment level continues exceed the needs to maintain the production at present levels. The existence of these resources from 1960-1979 is well identified by Ramos and Costa in table 4.

Table 4

Total employment, agricultural employment and

nonagricultural employment, 1960-1979

	1960	1965	1970	1975	1979
Total employment	3,126.0	3,207.1	3,180.1	3,082.8	3,133.5
Agricultural	1,297.3	1,095.9	894.6	820.0	771.2
Nonagricultural					
Private	1,645.2	1,892.8	2,032.4	1,986.4	2,029.6
Public	183.5	218.4	253.1	276.4	332.7

Source: "O emprego no Continente de 1980 a 1990".

Unity = thousand

Table 5

Evolution and projections of job supply in

nonagricultural sector

Year	Active total pop.	Agric. employm.	Job supply in nonagic.
1979	3,683.5	771.2	2,912.3
1980	3,726.5	749.6	2,976.9
1985	3,990.0	651.2	3,238.8
1990	4,013.3	565.1	3,448.2

Source : "O emprego no Continente de 1980 a 1990 "

Unity = thousand

The projections by Ramos and Costa (1982) of growth in total active population, agricultural employment, and supply of jobs out of agricultural sector are presented in table 5. According to their projections extrapolating past rates, active

population is expected to grow faster than the supply of jobs in agricultural sector. Thus the capacity of the nonagricultural sector to absorb labor is crucial for the Portuguese economy to continue the process of structural change without major adjustment problems in the labor markets.

According to Kuznets (1971) this conflict between sectoral demographic trends and changes in economic growth and employment opportunities has been the cause of much internal migration in growing economies. The acceleration in the rates of these intersectoral shifts is a distinctive and crucial characteristic of modern economic growth.

Portugal will undoubtedly continue to undergo important structural modifications in the agricultural sector. With entry into the EC, the Common Agricultural Policy (CAP) eliminates the autonomy of the country over most agricultural policies. In particular agricultural policies can no longer be used to address agricultural employment issues. Therefore developments in nonagricultural labor market are going to be of great importance. The most likely impact of CAP policies in Portugal is a decrease in agricultural product prices. This eventuality will increase pressures for labor to shift out of agriculture.

Intersectoral transfers of labor have been widespread in northwest Portugal. Some of this transfer occurred where geographical concentration permits transfers of labor between sectors without major locational changes. This characteristic combined with the increase in the industrial sector with the consequent creation of new employment opportunities in the region, has been of major importance in shifting labor out of agriculture and also explains the widespread phenomenon of part-time farming. The evolution of these part-time farms will play an important role in the development of the agricultural sector of the region.

Kuznets' cross-country studies of sectoral growth patterns show an association between per capita product and sectoral shares in total output or input. Given the income elasticities of demand for different outputs, the differing responsiveness of the production sectors depends on the rate of growth of per capita product and consequently generates major differences in rates of growth of the several sectores in the production system. This also generates changes in the production structure. The elasticity of response of the major sectors diminishes as the economy moves to higher product per capita. The structure of demand is then affected by institutional and technological changes that consequently influence economic growth.

The economic implications of removing labor from agriculture have been a topic of research and a source of controversy among economists. According to the Lewis model of a dual economy (Ghatak and Ingersent, 1984), the marginal productivity of agricultural labor is zero, although paid a positive subsistence wage. Therefore a contraction of the agricultural labor force would cause no decline in total output and ceteris paribus, an improvement in output per agricultural worker. Both labor transfer and urban employment growth are reached by output expansion in the modern sector. The process, assuming the reinvestment in the modern sector that consequently increases demand for labor, will continue until the surplus of rural labor is absorbed in the modern industrial sector. This process can occur at no cost in terms of agricultural output and the structural transformation of the economy will take place.

In the 1960s Schultz challenged the Lewis theory and argued that the zero value of the marginal productivity of agricultural labor is a false concept, because it rests on unsteady theoretical suppositions. It is based on the assumption that "there is no opportunity for technical substitution of factors in agriculture at any of the relevant margins". Schultz's opinion is that the productivity of labor is generally very low and agricultural production diminishes when some labor force is withdrawn, ceteris paribus.

Todaro, 1977, refering to some countries, says that large amounts of rural labor forces are underemployed,working less than they would like to work, because they have neither the complementary resources to work full-time, nor the opportunities for increasing their low incomes if they are working part-time. The causes of employment problems in Portugal are much more complex than a simple theory can portray. The return of emigrants and inhabitants of the ex-colonies in the 70's, and the numerous short-term governments, harmed Portugal in terms of employment and consequently the economy.

The Todaro model is based on the assumption that migration is a rational phenomenon that proceeds in response to urban-rural differences in expected rather than actual earnings (Todaro, 1977). The emphasis, on the income differential as a determinant of migration is based on the assumption of full employment in the economy. The adjustment mechanism development by Todaro by which workers move between rural and urban markets, has important implications for the economy. On the other hand Kuznets has defined the growing capacity of a country based on advancing technology. According to him advancing technology provides the basis for continuous economic growth. But a technological innovation without a parallel social innovation is generally not possible.

Portugal, and more specific the northwest region, is facing the problems of a high density population in the rural areas living on small, low productivity farms. Part-time farming is a widespread phenomenon in this region because nonagricultural employment is also widely available. Solutions to the transfer labor out of agriculture must conform with social constraints in rural families that see farming more as a way of life than a way to increase income.

Objectives

This study evaluates the economic incentives for agricultural households in the Entre Douro e Minho to change. Three patterns of interest are, continuing expansion in farming, continuing part-time farming, and leaving farming. The analysis will focus on the family as a decision-making unit with access to a particular set of land and labor resources. The markets for inputs and outputs that these families face will be strongly influenced by the Common Agricultural Policy (CAP) of the European Community (EC). It is expected that the changes in agricultural policy in the next decade will affect agriculture in Entre Douro e Minho in significant ways.

This study will address the issue of structural change in the districts of Porto, Viana do Castelo and Braga in terms of agricultural families' access to land and labor. Agricultural family labor in the northwest region is used very intensively and part-time farming plays an important role in the structural changes. After analyzing the distribution of land and labor those resources in a geographical way with the census statistics of 1979 and through the different types of farm models, alternative solutions are identified and also analyzed. The analysis based on agricultural households under the EC policies, identifies types of enterprises and the agricultural responses to the three aspects mentioned above: continuing expansion in farming, continuing part-time farming and/or leaving farming.

The overall objective is to address some of the challenges to the Portuguese economy as a member of EC, in the northwest region, and to provide information for future research in this field.

Methodology applied

To analyze the different household situations influencing expansion or decreasing of agricultural activities, farm budgets are used. The first step is to identify

the current farmers earnings and then consider the impact of no available family labor (i.e., all labor evaluated at full opportunity costs), measuring the profits for different technologies and farm sizes. The second step is completed when changes in family labor availabilities and changes in farm sizes are assumed to occur at the farm level. The third step is to simulate possible alternative price changes for agricultural outputs for the different situations analyzed before.

The model compares different farm profit levels when fixed labor available to the family varies from zero to 7,200 hours per year. Fixed labor is defined as that family labor which is available at zero opportunity cost. These hours at zero opportunity cost are calculated assuming that only some free family labor is available to work on the farm. The assumption of available fixed family labor is based on information that a high proportion of family labor exists on the farms.

Conceptual model

The model represents the total farm returns due to agricultural activities considering their revenues and expenses during the year. this model is useful for identifying areas of needed management improvements and for planning farm organization and expansion. In this study it is important to know the components of total cost, such as labor or capital. Finally, a comparative analysis of the different farm types is made in order to identify the key factors affecting farm profits and to identify acceptable standards with respect to labor costs and overall farmer earning from the farm activities. Will farmers expand farming or will traditional farming persist? Will farmers abandon farming or will part-time farming be a viable alternative? What will be the farmers responses to EC policies mainly that change output prices? The answers to these questions are the issues of interest in this study.

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The profits of the different farm types indicate the economic incentives for alternative allocations of land and labor. The returns to labor are also considered in order to make a comparison with salaries in other job alternatives and then identify which farmers will probably leave farming or decide to stay farming.

CHAPTER TWO

DESCRIPTION OF LAND AND LABOR RESOURCES AND

THEIR DISTRIBUTION AMONG RURAL FAMILIES

Introduction

In order to give an overview of the agricultural sector in the Entre Douro e Minho region, data from the Agricultural Census of 1979, the most recent available, was used. Three important stratifying categories can be identified in the census data: land area, family demographics, and percent of family time spent in agricultural activities. The first, land, is a severe constraint for many farmers in the northwest. Small and fragmented farms of less than 1 hectare make up the vast majority of all the farms in the region. This situation is crucial in the evaluation of structural and technical changes.

The household demographics category is important because it indicates the distribution of family labor available on farms. In this category, age of the head of household is a variable of great importance. Young adults have more opportunities for outside jobs or work on farms and more easily adapt changes and try innovations. On the other hand, part-time farming is only an option for families with members of employable age.

The third variable, geography, relates the analysis in the three districts of the region in order to identify the distribution of the different resources and also the access of opportunities for labor outside the agricultural sector.

Land area

According to the information of the Agricultural Census of 1979, shown in table 6, the farm structure situation in the Northwest is very clear. The average area per farm for the three districts is very similar, although Viana has a few relatively large farms (>=10ha). The average farm size for the region as a whole is 2.25 hectares. The smallest

category of farms (0-1 ha) includes one-half to two-thirds of all farms in each of the three districts.

Table 6

Farm size, number of farms and percentage distribution in Porto,

Viana and Braga, 1979

Farm Size		Porto			Districts Viana			Braga	
ha	num.	%	av.ha/ farm	num.	%	av.ha/ farm	num.	%	av.ha/ farm
0-1	31,417	57.6	0.46	25,418	60.7	0.66	28,608	51.9	0.52
1-3	14,133	25.9	1.81	13,234	31.6	1.80	16,637	30.2	1.90
3-5	4,161	7.6	3.96	1,955	4.7	4.08	5,156	9.3	4.07
5-10	3,127	5.7	7.01	848	2.0	7.26	3,412	6.2	7.04
>=10	1,697	3.1	20.82	424	1.0	149.77	1,354	2.4	21.11
TOTAL	54,535	100	2.08	47,191	100	2.50	55,167	100	2.18

Source: RAC, 1979

Rural population and family demographics

Of equal importance is the agricultural population living on the farms and the active population that contributes to agricultural production activities. Table 7 gives the distribution of the active agricultural population by age. In 1979, more than six hundred thousand people were living on farms, representing 24% of the total population of the region. There were 429,187 people actively working on farms, nearly 66% of the total rural population. Overall, Entre Douro e Minho shows a high percentage of labor force between 20 and 64 years of age, but the percentage of elderly people working on is also very significant.

Table 8 shows the size distribution of agricultural households in the Entre Douro e Minho. It's evident that rural families tend to be quite large. Forty percent of the households have five or more family members living on the farms.

Table 7

Distribution by age of the total agricultural population living on farms and the agricultural active population, 1979

Age Year	Total agric. pop. Number	%	Active agric. pop. Number	%	% of Total
<=12	13,6729	20.9	22,731	5.3	17
12-14	49,366	7.6	33,367	7.8	68
15-19	81,123	12.4	58,861	13.7	73
20-34	107,331	16.5	76,128	17.8	71
35-44	64,156	9.8	56,406	13.2	8
45-54	81,049	12.5	71,965	16.7	89
55-64	65,867	10.1	59,371	13.8	90
>=65	66,005	10.2	50,358	11.7	76
Total	651,685	100.0	429,187	100.0	66
%	100		66		

Source: RCA, 1979

Table 8

Agricultural household composition

by number of members in the family, 1979

	1	2	3	4	5	>=6	Total
No.	13,175	27,144	24,359	24,900	20,759	40,747	151,084
%	8.7	18.0	16.1	16.5	13.7	27.0	100.0

Source: RAC, 1979

Equally important is the distribution of the heads of households by their age, as table 9 shows. Although roughly one-quarter of the total agricultural population is 55 years or old, almost one-half of the heads of households fall in this category. For these people opportunities for jobs off the farm are very difficult which makes many of them stay in agriculture.

Table 9

Distribution of agricultural households by age category

of the heads of households, 1979

Age	Number	%
<=25	1,863	1.2
26-34	11,998	7.9
35-44	25,153	16.7
45-54	40,120	26.6
55-64	36,214	24.1
>=65	35,605	23.5
Total	150,953	100.0

Source: RAC, 1979

Family size and land area

Also important is the relationship between farm size and family structure (size and age distribution). Table 10 shows that as a group, young farmers operate the smallest farms, where technological changes are likely to be more difficult to implement.

Table 10

Distribution of heads of households by age and farm size, 1979

Farm size ha		<=25	26-34	35-44	45-54	55-64	>=65	Total
				(Number)				
0-1	No.	1,319	8,384	14,679	20,828	19,082	21,032	85,324
	%	1.5	9.8	17.2	24.4	22.4	24.6	100
1-3	No.	412	2,605	7,194	12,524	11,350	9,899	43,984
	%	0.9	5.9	16.4	28.5	25.8	22.5	100
3-5	No.	85	512	1,717	3,536	2,917	2,345	11,112
	%	0.8	4.6	15.4	31.8	26.3	2.11	100
5-10	No.	33	323	1,127	2,272	2,000	1,583	7,338
	%	0.4	4.4	15.4	31.0	27.3	21.6	100
>=10	No.	14	174	436	960	865	746	3,195
	%	0.5	5.4	13.7	30.0	27.1	23.3	
Total	No.	1,863	11,998	25,153	40,120	36,214	35,605	150,953
	%	1.2	7.9	16.7	26.6	24.1	23.5	100

Source: RAC, 1979

The largest farms are predominantly in the hands of the individuals 45 and over, and overall, 90.9 percent of all farms are operated by people 35 and over.

Also important is the distribution of the number of family members working on the farm by farm size. Table 11 gives the number of active family members per households by age and farm size. For example, small farms (0-1 ha) have on average 0.12 family member twelve or younger that work on the farm. The smallest farms have fewer active family members on average than do the larger farms. However, the smaller farms have on average a larger number of active people per hectare as table 12 indicates. Once again these figures reveal that a high proportion of the rural population lives on the smallest farms. It is important to notice that nearly 40% of the active population is less than 14 years or more than 55 years of age.

Table 11
Average number of active family members per farm, by age and farm size, 1979

| Age (years) | Farm size (hectares) | | | | | All Farms |
	0-1	1-3	3-5	5-10	>=10	
	number per farm					
<=12	0.12	0.18	0.25	0.23	0.16	.19
12-14	0.16	0.27	0.32	0.31	0.23	.26
15-19	0.29	0.46	0.60	0.60	0.49	.49
20-34	0.45	0.54	0.63	0.70	0.72	.61
35-44	0.36	0.37	0.40	0.40	0.33	.37
45-54	0.41	0.53	0.61	0.60	0.60	.55
55-64	0.36	0.44	0.48	0.49	0.44	.44
>=65	0.34	0.35	0.34	0.39	0.37	.36
Total	2.50	3.13	3.63	3.72	3.34	3.27

Source: RAC, 1979

Table 12

Average number of active family members per farm and per hectare by farm size, 1979

ha	people/farm	people/ha
0-1	2.50	4.65
1-3	3.13	1.70
3-5	3.63	0.90
5-10	3.72	0.53
>=10	3.34	0.12
Total	3.27	1.58

Source: RAC, 1979

Graph 1 shows the allocation of people working per farm as farm size increases for the region. The number of people per farm increases by farm size for the group of farms less than 3-5 hectare and it decreases for farms bigger than that.

Graph 2 shows the allocation of people working per hectare as farm size increases. The number of people per hectare decreases when farm size increases, but for farms 0-1 hectare the number of people working is extremely high and it sharply decrease between this group size and the 1-3 hectare group for all districts and the whole region.

Allocation of labor between agricultural and nonagricultural activities

An important issue is the work time spent by the farmer and his family on the farm and in nonagricultural activities, and also the percentage of work time by salaried workers. Census information on the amount of time spent in agricultural activities was based on subjective questions. The respondent was asked to indicate the percentage of time each family member spent in agriculture. Thus, the percentage of time spent on the farm given by the farmers cannot be treated as a quantitatively accurate measure but rather indicates farmers' perceptions about the amount of time spent in farming activities by household members.

Table 13 shows that the percentage of family members working full-time on the farm is very small. Only 46% of the people spend more than 75% of their work time on farm. Of those people that work on farm, one half spend less than 75% of their work time on their farm. This is a good indicator showing that the size of the farms favors part-time farming, not only because it doesn't demand so many hours of work, but also because it doesn't provide enough income to support the farmer and his family. These small amounts of land, allowing part-time farming, consequently give the farmer and his family many free hours work off the farm. These farms are often farmed during the weekends and vacations, or in the evenings, after returning from another job. Households

Graph 1 — people working per farm

Graph showing "People per farm" (y-axis, 0 to 5) versus "Farm size — hectares" (x-axis). Data points:
- 0–1: 2.50
- 1–3: 3.13
- 3–5: 3.63
- 5–10: 3.72
- >=10: 3.34
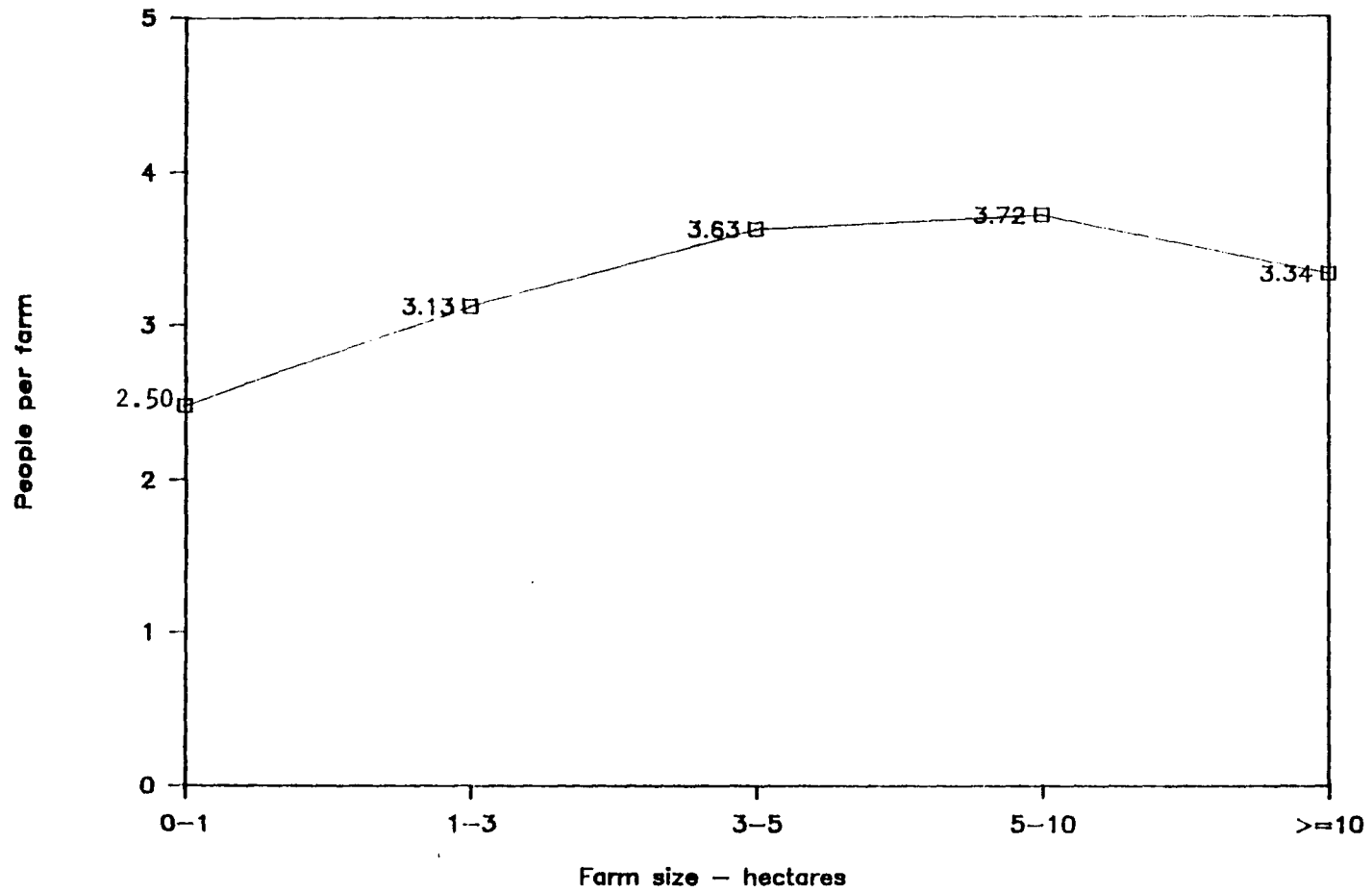
Graph 2 — people working per hectare

People per hectare (y-axis): 6, 5, 4, 3, 2, 1, 0

Data points:
- 0–1: 4.65
- 1–3: 1.70
- 3–5: 0.90
- 5–10: 0.53
- >–10: 0.12

Farm size — hectares (x-axis): 0–1, 1–3, 3–5, 5–10, >–10
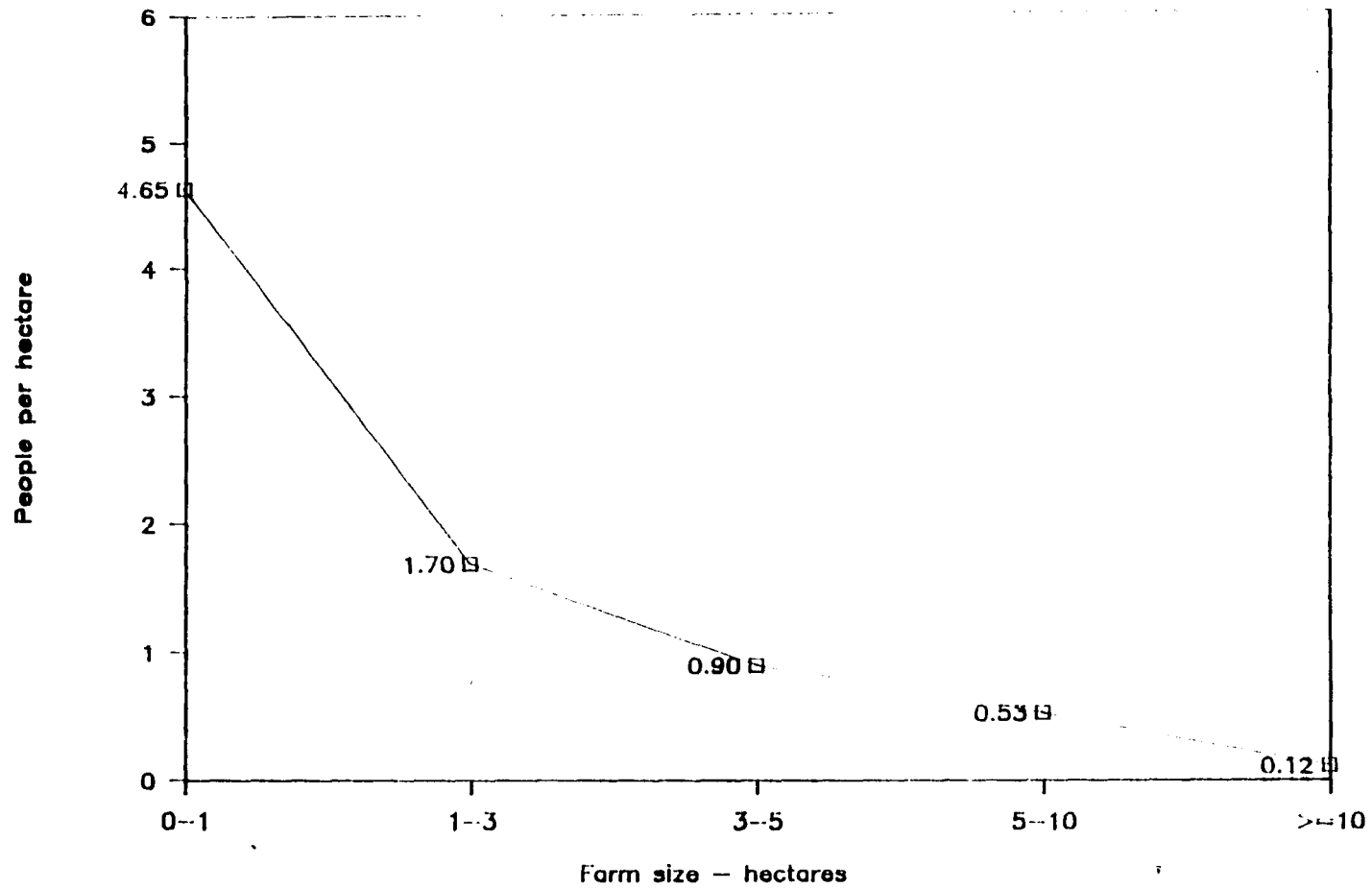
also have children, women, and older family members that do some work on farms while the husbands work off the farm. There is also a large portion of people not dedicating any time working on the farm, although they live on the farm (22%). Some of these people have jobs out of agriculture or some are simply unemployed.

Table 13

Active agricultural population by percentage of time spent working on the farm:

family and salaried labor, 1979

| % of work time | Family labor | | Salaried labor | | Total |
	Number	%	Number	%	Number
<25	101,830	24	3,996	23	105,826
25-49	69,107	16	3,039	17	72,146
50-74	60,309	14	2,105	12	62,414
75-99	71,711	17	1,860	11	73,571
100	126,230	29	6,563	37	132,793
Total	429,187	100	17,563	100	446,750

Source: RAC,1979

Table 13 shows how much labor is absorbed at various levels of employment (work time). From these data standard labor requirements may be derived and then subtacted from the labor stock to find the surplus of labor. This problem will be examined in the next chapter which deals with determinants of the supply of labor to agricultural production. The greatest percentage of salaried farm labor works full time (37 percent) but salaried labor represents only 4 percent of the family labor showing that most of the agricultural labor in this region comes from the family rather than being hired.

Table 14 provides information about daily hired labor by farm size. In general the percentage of labor varies inversely with farm size; the smallest farms are the ones that use the most daily labor. This is particularly evident for farm sizes less than 3 hectares. It can be concluded that the smallest farms are the ones showing more constraints in terms of need for labor in particular times of the year. This is logical, if one recalls that a major characteristic of the small farms is the diversified crop and livestock activities, that results in more critical times for labor during the year but allows farmers to spread out labor demands. Small farms are the ones having more labor of any kind: 48% of workers work on farms with less than 1 hectare and 80% work on farms with less than 3 hectares. Small farms are the ones requiring more seasonal labor (2,204 people work on farms less than 1 ha) which once again shows the importance of part-time farming on these farms. It is important to recall that family labor is the main source of labor in this region (94.3%), and the smallest farms are the ones using it in greatest

Table 14

Number of people working on the farm by farm size:
family, salaried and daily labor, 1979

Farm size	Family labor Number	%	salaried labor Number	%	daily labor a) Number	%	total Number	%
0 - 1	212,392	97.6	3,056	1.4	2,204	1.0	217,652	100
1 - 3	137,491	95.2	4,298	3.0	2,603	1.8	144,392	100
3 - 5	40,938	92.4	2,259	5.1	1,115	2.5	44,312	100
5 -10	27,569	87.3	2,880	9.1	1,141	3.6	31,590	100
>= 10	10,797	62.9	5,070	29.5	1,311	7.6	17,178	100
Total	429,187	94.3	17,563	3.9	8,374	1.8	455,124	100

Source: RAC, 1979

a)RAC information was given in hours per year but assuming 300 days of work per year, the number of correspondent people was calculated.

percentage: 97.6% of the total labor used in farms of 0-1 hectare is family labor. This value decreases with the increase in farm size (table 14). In percentage of total labor, salaried and daily labor, by contrast, increase with the increase in farm size.

Some lack of information must be noted. The agricultural census definition of the working population included only those with more than 12 years old that had worked or were working on the farm. Also farms had to obey to some specific characteristics in order to be surveyed. At least one of the following characteristics was required:

1- Agricultural area greater than 500 square meters (including forest).

2- Agricultural area less than 500 square meters but with at least some livestock activities or flowers, green house and nursery garden at least 500 square meters of area. Also it would be a farm with 1,000 square meters of garden. 2,000 square meters of vineyards or 2,000 square meters of orchards, or 2,000 square meters of hops (Luis Albuquerque, 1985).

These definitions of farms and population dont give full information about enterprises and people living or working there. However the lack of information was not an obstacle for utilization of the RAC 1979 data. The absence of alternative data sources with identical level of dissagregated information eliminated alternative choices.

Opportunities for work outside agriculture are significant in the Northwest. The coastal zone has much of the regional industry, and this is the zone where the industrial employment is most concentrated. Porto and Braga are the two most important urban centers. The textile industries and construction are the most important sectors in terms of employment absorbing approximately 233,000 members of the regional work force. The total industry employment of the region represents nearly 32% of the total of the country (table 15). The importance of nonagricultural employment is evident.

Table 15

Nonagricultural employment by economic sector

in Entre Douro e Minho and the Country, 1984

Economic Sector	Portugal	Entre Douro e Minho (Number)	(Percent of Portugal)
I-Mining	14,999	2,702	18
II-Manufacturing	821,996	330,624	40
of which:			
Textiles	265,533	181,559	68
III-Construction	158,277	51,379	32
IV- Services	865,154	161,392	19
Total	1702,149	546,102	32

Source: Langworthy, 1987

Agricultural production technologies

Table 16 provides information about the distribution of the main products in the region by farm size. The Northwest produces mainly corn for grain, milk, potatoes and wine (vinho verde) predominantly on the small and highly fragmented farms that account for about 75 percent of regional agricultural production (Finan, 1987). Farms of less than 10 hectare account for roughly 83% of the total area of the main crop activities: corn for grain, potatoes, annual forages and grapes. Grapes are an important crop activity in the region that includes 100% of the "vinho verde", a specific type of wine. Wine is of great economic importance for small farms, accounting for a large percentage of area cultivated, as table 16 indicates.

Table 16

Distribution of crop activities by farm size in the

Entre Douro e Minho region, 1979

Farm size (ha)	Corn grain	Potatoes (% of cultivated area)	Annual forage	Grapes
0-1	11.1	27.5	16.4	22.2
1-3	23.0	29.3	31.4	33.0
3-5	18.1	14.1	22.8	16.0
5-10	24.9	15.5	14.2	15.4
>=10	22.9	13.6	15.2	13.4
Total	100	100	100	100

Source: RAC, 1979

In terms of livestock acivities, dairying is very important in the Entre Douro e Minho. The region accounts for 30.0% of the national supply of milk excluding production of the Azores islands. According to Mendes (1985), dairying contributes 24% to the agricultural GDP of the Region. Milk is produced largely on small farms with 97.5% of the producers owning less than 10 cows and producing 79% of the milk in the region (Damiao, 1987). An average of about 30,000 farms in the EDM produce milk (Finan, Fox and Langworthy, no date). This high level of milk production reflects the great importance of milk in the agriculture of the region and its contribution to income of the agricultural population.

Conclusions

The large number of small farms with an average of 0.46 hectares are the ones showing the highest ratio of population to land size. The large rural population living on these small farms also contains a high percentage of part-time labors. The labor/land

ratio is also very high on these small farms (2.49 people per farm and 4.65 people per hectare).

Also very important and critical is the elderly population that not only lives on the smallest farms but also are the workers and the heads of households. This is so because there are few opportunities outside agriculture for many of the older farmers.

Agricultural families in the Northwest appear to have a large amount of fixed labor, and the smallest farms are the ones having the highest proportion of family workers with low or zero opportunity costs.

Following the concepts discussed above, growing attention has been given to the relationships between levels of fixed labor and net revenues, and alternative farming responses to changing economic incentives have also been analyzed. The simulations of farms accounts for different farm types are developed and analyzed in chapter 3.

CHAPTER THREE

FARM TYPES IN NORTHWEST PORTUGAL AND ALTERNATIVE

STRATEGIES FOR AGRICULTURAL HOUSEHOLDS

Farm types overview

In northwest Portugal, agricultural production systems vary from small traditional farms to larger commercially oriented farms. However, traditional agriculture is still the major system practiced in the region. Whole-farm systems presented by Fox and Finan (1987) are used in this study to represent the major farm types found in northwest Portugal. These systems are considered to be the most representative types found in the region.

The traditional general farm type is a diversified system typical of the small-sized farms in the Northwest with corn/beans mixture rotated with winter forages (e.g., ryegrass). A small area of grapes and potatoes is also produced in the traditional general system. Intensive family labor is the basic farm technology characteristic of this farm type. Animal traction, provided by the traditional cow breeds, is used for all operations.

The farms in this region vary in size and degree of crop specialization. Two additional systems are included in the analysis that are more specialized in certain outputs. The more specialized milk systems are more intensively cultivated than the traditional system and produces more milk. Corn and beans also play an important role in the rotation of these systems with the winter forages, although hybrid corn seed is used instead of the traditional corn seed. In these systems specialized (Holstein/Friesian breed) milk cows replace the traditional breeds. Labor hours are drastically reduced as corn forage replaces corn for grain. Use of machinery and modern inputs is assumed in the specialized dairy systems. Corn for silage rotated with winter mixed forages, is the base to feed the animals. Dairy systems are assumed to vary with the farm size. The small

dairy farms vary from the traditional system in two characteristics. First the traditional corn seed is replaced by the hybrid corn seed, second the traditional cows are replaced by modern dairy cows that are more productive but demand more feed and management.

As dairy farms increase in size, technological changes toward modernization are assumed to take place. Corn for grain is substituted by corn silage and specialized milk cows replace the traditional breeds. All land is increasingly used for feed production which raises milk yields. But a small area is also reserved for potatoes. Wine is not produced in the larger milk systems (10 Ha). Many of the specialized dairy farms are quite small, approximately one hectare. It is relatively easy for small traditional farms to specialized in dairy production; this is why the traditional system is analyzed only for the 1 hectare and 3 hectare farms.

Dairy specialization is widely observed in the region, particularly within the coastal zone. The wine system, one the other hand, represents a different direction of specialization. Presently, not many farms are moving in this direction. This system is included as a possible future specialization option. A pure wine grape production system is considered, without transformation into wine.

It is important to note that the traditional system is the most common in the region, particularly among the small farms of one to three hectares. Only a very few specialized wine production system are presently experimenting in technology and innovation. The milk system seems to be the basic model of technical change.

Farm sizes and respective farm accounts considering labor as totally hired.

Four different sizes of farms are considered for each of the three production systems described above: one hectare, three hectares, five hectares and ten hectares, with the exception of the traditional system where only one hectare and three hectares are analyzed. These selections span the range of farm sizes presently found in the region.

Table 17 shows the crop and livestock outputs of the three farm types for each size category.

Table 17

Farm Activities per system and farm size.

| System | Farm Activities | |
	Crop	Livestock
Traditional	corn/beans,potatoes	traditional cow
1 ha and 3 ha	grapes and ryegrass	0.57 steers per cow
Dairy		
1 ha	corn/beans, potatoes	milk cow giving
	grapes and ryegrass	0.62 steers per cow
3 ha and 5 ha	corn silage, potatoes	milk cow giving
	grapes and ryegrass	0.62 steers per cow
10 ha	corn silage, potatoes	milk cow giving
	and permanent pasture	0.62 steers per cow
Wine	grapes	

The component activities of each system are those described by Fox and Finan (1987) with additional production information given by Damiao (1987). Prices, as reported in Damiao, for all inputs and outputs except wine, for which the 1983 price quoted in Fox and Finan was adjusted to the 1986 price level using the Consumer Price Index. Feed requirements were calculated based on Finan (1987): 1 hectare of land can support 2 cows. For 3 hectare, 5 hectare and 10 hectare dairy systems the feed requirements to calculate the number of cows each system could support were based in the following information from Fox and Finan (1987):

One milk cow requires 2,595 forage units (F.U.) and feed production values were given by the same authors:

corn	1.16 F.U./Kg
corn tops	.20 F.U./Kg
stalks	.20 F.U./Kg
ryegrass	.10 F.U./Kg
hay	.33 F.U./Kg

Fixed costs from Damiao (1987) were adapted for the four dairy systems. For the 1 hectare dairy system the small dairy fixed costs were used. For the 3 hectare and 5 hectare, the medium dairy fixed costs were used, and for the 10 hectare the fixed costs of the large dairy system were adopted. The technical changes considered in these alternatives vary with farm size. The 5 hectare and 10 hectare dairy systems represent a modern technology where a private milking parlor and a refrigerated bulk tank are assumed to exist. Fixed capital costs for these farms are very high (appendix A). The 1 hectare and 3 hectare dairy systems are assumed to use collective milking parlors operated by the local dairy cooperative, and the traditional systems are assumed to use cooperative milk reception posts for collection and transport of milk to processing plants.

The traditional cows and 1 hectare dairy cows are assumed to be fed entirely with feed produced on the farm.

The four alternative dairy systems permit evaluation of scale impacts of technological changes and the possibilities to increase total household income. These alternatives help identify conditions that permit rural families to face the challenges of the EC.

Appendix A shows the farms accounts calculated for each system, and table 18 shows a brief summary of their profits and costs. Two important remarks are necessary:

First, farm size is a constraint in order to provide more income to the farmer (table 18). Second, technical changes play a very important role in profitability (table 18).

Dairy systems with improved technology give greater profitability. Indeed, the 1 hectare dairy system has a positive profit but still very low. Larger farms show a great improvement when the land constraint doesn't exist and technical changes take place.

Capital and purchased input requirements are higher in the more specialized systems. The wine systems have the highest capital costs, reflecting the cost of the vineyards (table 18).

Table 18

Quantitative characteristics of the different sized farm system, 1986

Profits: 1,000 escudos per farm size and system

System	1 ha	3 ha	5 ha	10 ha
Traditional	-37	-11		
Dairy	179	1,080	1,796	3,264
Wine	30	91	153	305

Purchased input costs: 1,000 escudos per farm size and system

System	1 ha	3 ha	5 ha	10 ha
Traditional	74	223		
Dairy	198	1,042	1,738	3,013
Wine	97	292	487	974

Capital: 1,000 escudos per farm size and system

System	1 ha	3 ha	5 ha	10 ha
Traditional	40	120		
Dairy	66	936	1,563	2,383
Wine	99	296	494	988

From the farm accounts in appendix A, table 19 shows the different labor demands per year for each system and farm size.

Table 19 indicates that labor savings are dirived from some degree of specialization and corresponding technical changes. The traditional system is the most labor intensive requiring nearly one year of full-time equivalent labor per hectare of land (2400 hours per year). On the other hand, the other systems are more capital intensive. The dairy system exhibites economies of scale in labor.

Table 19

Labor Demands: hours per year per each system,

and farm size

System	1 ha	3 ha	5 ha	10 ha
Traditional (mixed)	2,220	6,660		
Dairy	1,259	2,677	4,449	7,162
Wine	1,011	3,033	5,055	10,110

The incentives to increase farm size and to adopt labor-saving technical changes represent the economic pressures to reduce agricultural employment in the Northwest. The adoption of technical changes and the consequent decrease in the agricultural labor force is a major policy concern.

Farm accounts for each family type at 1986 prices

As was shown in chapter two, average family size in the agricultural sector in the northwest of Portugal is quite large. A great number of people are living in rural households. Most of these are small traditional farms. For these families income from off farm employment has to be a resource for living assuming that there exists some opportunities to work and that technical changes in agricultural can take place.

One aspect of this study is to identify types of families in each farm system and analyze the different scenarios that they face in the utilization of their available labor time.

The three farm systems form the basis for the alternative farm accounts which take into account available family labor. The inclusion, in the farm account model, of some family labor with zero opportunity cost means thata part of the family labor has opportunities of getting off-farm word. With some hours at zero opportunity cost, the families face different situations. This assumption means that in the family some children less than 14 years old and some women work on the farm, although their husbands have off farm jobs. Children and women are the ones having less off-farm job opportunities, especially if the latter are older than 35. Appendix B contains the simulations for a family with 1,200 hours, 2,400 hours, 3,600 hours, 4,800 hours and 7,200 hours of labor at zero opportunity cost. This approach takes into account the findings in chapter two which show that in the region family labor is the main labor resource for agriculture.

In the simulations using the farm accounts model described in chapter one, the following aspects were considered:

1. One unit of labor working 8 hours per day during 300 days per year, makes 2400 hours per year.

2. The agriculture salary was equal to the minimum wage rate in 1986, 98.00 escudos per hour (Damiao, 1987).

3. Annual land cost was calculated on the basis of 3,000,000 escudos per hectare, assuming an interest rate of 2 percent per year (Monke, 1987) giving an annual cost of 60,000 escudos per year per hectare. The range of land value in the region is from 200.00 esc./m2 to 1000.00 esc./m2, but larger farms are sold at lower values per hectare.

4. All the other values are taken from the alternative systems presented in appendix A.

Table 20 reports farm returns per hectare for the different labor situations of each system and farm size. These returns are returns to land, considering the agricultural revenues and agricultural expenses. All farm types and sizes show that returns are higher than the assumed average annual land cost of 60 thousand escudos per hectare when some labor hours at zero opportunity cost str available. In each of these cases, all activities are profitable when compared with selling land, but the small traditional farms are the ones approximating the breakeven values when 1200 hours of labor at zero opportunity cost are available and the farm size reaches 3 hectare. If the 3 hectare traditional farms have more available labor hours at zero opportunity cost, then it is evident that they can improve profitability.

On the other hand, the traditional system is the one showing lower returns than the land value (60,000 escudos per hectare) if there are no available labor hours at zero opportunity cost.

Wine systems with more than 5 hectares and 1200 hours of family labor, have returns approximatly twice the land value considered (60,000 escudos per hectare). The wine system, which includes only grape production, shows that with increases in farm size, greater amounts of available of family labor are required in order to improve farm returns. In general only the dairy system generates higher returns that justify the expansion to commercial farming for all situations of labor availability at zero opportunity cost. The traditional and wine systems are less profitable alternatives in these specific situations.

The results indicate that, under current economic conditions, all farm types represent attractive alternatives to those families that have some stock of labor which has no access to employment alternatives off the farm. This result implies that part-time

Table 20

Farm returns per hectare and farm type at 1986 price levels

Hours at zero opportunity cost

Farm type	0	1,200	2,400	3,600	4,800	7,200
			(1,000 escudos per hectare)			
1 ha						
traditional	54	172	272	272	272	272
Dairy	270	388	394	394	394	394
Wine	123	222	222	222	222	222
3 ha						
Traditional	54	94	133	172	211	272
Dairy	453	492	531	540	540	540
Wine	123	162	202	222	222	222
5 ha						
Diary	542	476	499	523	539	539
Wine	123	147	170	194	217	222
10 ha						
Dairy	417	428	440	542	464	487
Wine	123	135	147	159	170	194

farming will continue, and the process of transforming agricultural holdings into larger units will be slow if output price changes do not take place.

Farms accounts for each family type considering changes in output prices.

This section simulates farm accounts for the same family types considered in the previous section but with changes in output prices. This method estimates farm income responses due to the adoption of EC prices in ten years time. EC,CAP policies are expected to change some output prices. Table 21 shows the price changes considered for the study.

Table 21

Farm output prices: 1986 and projected 1996

Product	Unit	1986 Price	Projected 1996 Price
		escudos per unit	
milk	liter	45	30 a)
white wine	liter	36	37 a)
red wine	liter	33	34 a)
brandy	liter	150	150 a)
beef	kg	508	431 a)
potatoes	kg	20	20 a)
beans	kg	100	100 a)
labor	hour	98	118 b)

Source: a) From Damiao, 1987

b) Adapted from Monke in Pearson et al. (pag 80)

From the respective farm accounts in appendix C, table 22 shows the returns per hectare and farm type, considering different amounts of fixed family labor. The results indicate that the one and three hectare traditional farms are unprofitable with the

Table 22

Farm returns per hectare and farm type at projected 1996 price levels

Farm type	Hours at zero opportunity					
	0	1,200	2,400	3,600	4,800	7,200
	1,000 escudos per hectare					
1 ha						
Traditional	-44	97	217	217	217	217
Dairy	115	256	263	263	263	263
Wine	114	233	233	233	233	233
3 ha						
Traditional	-44	3	50	97	144	218
Dairy	135	182	229	240	240	240
Wine	114	161	208	233	233	233
5 ha						
Dairy	134	163	191	219	239	239
Wine	114	142	171	199	227	233
10 ha						
Dairy	132	146	160	174	188	216
Wine	114	128	142	156	171	199

lower output prices. But if these families have one person-year or more of fixed labor they can earn some revenue and they are not expected to leave farming. Part-time farming, if available, will continue to play an important role.

Dairy and wine farms show a drop in farm returns with changes in prices, but they still have greater returns than selling land at 60,000 escudos per hectare. As a result dairy and wine systems of all sizes are expected to continue to exist and farmers are not expected to leave farming. Here, part-time farming also plays an important role. It is important to notice that with the drop in output prices, the price of land is expected to fall which will make the continuation of farming even more favorable.

CHAPTER FOUR

CONCLUSIONS

General panorama

This study has focused on the different aspects of agriculture in the northwest of Portugal with special emphasis on the labor force used on different sized farms. Considering the three types of farm systems described in chapter three and comparing the needs of labor with the findings of chapter two from the 1979 agricultural census, some important conclusions can be drawn.

First, comparing the needs and the present availabilities of agricultural labor, assuming that the 0 to 3 hectare traditional farm system is predominant and, for farms greater than 3 hectares, the dairy system is the most widely adopted, the results indicate an excess of labor for all farm sizes. It is evident that the greatest number of farms are 0 to 3 hectares, which implies an excess of labor on these farms. In other words, much of the rural population is trying to live on the smallest, low productivity farms.

Traditional farms face continuing economic incentives to specialize, particulary in dairy. The wine system requires a large capital investment. Also, it is easier for farmers to adopt more specialized dairy systems from the mixed traditional one. But the adoption of larger-scale dairy technologies will decrease demand for agricultural labor in the region. The wine system also requires less labor than traditional system but more than dairy.

The projected reduction in output prices in 1996 will result in a reduction in on-farm income of 25% compared to 1986 for small traditional farms and 56% for small dairy farms. Negative profit levels are projected for the medium and large dairy farm systems. The more advanced milk systems will lose the high levels of price protection of the pre-accession Portuguese policy, causing profits to fall. But the traditional small farmers also are expected to lose income and face the pressures of change. Overall,

northwest farmers will face limited choices. The land constraint for increasing commercial operations and to improve technologies plus the risks faced by the fluctuations of prices, will create serious problems for the improvement of northwest farming, thereby pushing some small farmers to abandon their enterprises. Current policies also affect the increase of commercial operations, for example by prohibiting the expansion of wine grapes for "vinho verde". For others, part-time farming remains viable.

The results of this study suggest that part-time farming will continue as an economically viable strategy for those families with access to land and some fixed family labor. Therefore, widespread land transfers to create larger farms will not occur unless other employment opportunities become available for labor that is presently fixed in agricultural activities. Off-farm opportunities may grow with entry into the EC.

Alternative solutions

To create jobs for a large labor force with limited supplies of both capital and land is a difficult task because the amount of land and capital available per worker does not allow for rural evolution and development. Any transfer of labor from agriculture to another sector is therefore crucial to advance farm labor productivity. It is evident in northwest Portugal that the vast number of farm families, whose members constitute the main agriculture work force, consider agriculture not only an occupation or a source of income but also a way of life where farmers are closely attached to their land and devote long days to its cultivation. Any change in the structure of farming forces changes in the farmers' way of life, one of the reasons why technological changes are not expected to occur on the small traditional farming system in that region.

The implications of this study are that dairy farms have the greatest incentives to expand into larger commercial, full-time farms. The wine system depends on higher grape prices or expansion into processing, which requires specialized skills and great amounts of

capital. At current prices the wine system does not look very attractive. Small traditional farmers will face the biggest economic pressures and those with no fixed labor are most likely to exit entirely from farming. But part-time farming will continue to be a viable alternative, mainly for the small scale farms which are the largest number of farms of the region.

Economic theories suggest that the system of prices may be of importance in at least two respects; first, in helping determine which techniques are selected from the choices available, and second in affecting the incomes of agricultural producers. With the negative changes in milk price due to the evolution of the CAP, the traditional systems that exist in the region are not expected to change in technology toward dairy systems, not only because diversification will be less risky but also because "free" fixed labor is expected to be available for part-time farming.

The system of prices cannot be treated as an independent parameter. Policies visualizing improvements and the appearance of new industries also will play an important role in the northwest region. From a survey that took place in the Porto, Braga and Viana do Castelo districts some industry sectors are expected to create jobs. The construction industry foreseeing the linkages among EC countries is expected to expand. Road construction has already begun in the region. Also, opportunities for off-farm employment may grow with entry into the EC. European industries have already started to invest in Portugal.

Thus, part-time farming even in the small traditional farms, is likely to continue, perhaps as an activity for the weekends and evenings. This additional source of income will permit small farmers to increase their earnings, even though they may not have an interest in expanding their farming operations into a full-time activity. On the other hand, if all families have access to good off-farm employment opportunities, small part-time farming may be a good situation, even with a decrease in output prices. This situation also

creates a source of funds for agricultural investments to improve technology on the small traditional farms. The presence of these linkages between the agricultural and nonagicultural sector, if it continues to take place, is expected to give more incentives for part-time farming.

Policy implications

The connection between the technological changes in production and the changes in demand for labor are evident. The process by which these changes will take place is unclear. There is scope for policy to direct this process. A number of specific questions should be considered. What should be the process by which the traditional low productivity farms are transformed into high productivity enterprises? Are the small farmers acting rationally within the context of their particular environment or is the problem a lack of information or capability? Will economic incentives exist to promote structural changes in the rural farming systems or will changes in attitudes be more complex? How can rural development be achieved?

Policies have to be derived to facilitate the movement of people out of agriculture because spontaneous large-scale movement is not likely. This implies that not much land will be available for commercial farms to increase their scale.

Policies with the objective of the labor reduction in agriculture include early retirement programs, training/education programs directed towards the nonagriculture sector, and regional policies to increase nonagricultural employment in the region by using EC funds to expand this sector.

Further research

It would be useful to study the relative impact of ownership versus rental of land on technology changes. The adoption of technologies and innovations that require large amounts of investment is often conditioned by the farm tenure situation.

Another important aspect is the influence of output price changes and the impact on the demand for labor. According to Traill (Mellor, 1980), output prices do not impact on the demand for labor but induce labor-saving capital investments. Is this the case for northwest Portugal?

Also the influence of EC support prices on the demand for other inputs would be useful to analyze. Will EC prices have a greater impact on the utilization of inputs other than labor, and consequently indirectly influence the requirements for labor in agriculture? More research needs to be done on this specific matter. This study leads to the conclusion that structural changes will occur slowly and part-time farming will continue to be viable.

APPENDIX A

FARM ACCOUNTS CONSIDERING LABOR AS TOTALLY HIRED

Table A.1.- Farm accounts for 1 ha of traditional cultivated area

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost esc.	Fix.Var.Cost esc.esc/unit	Total VarCost(esc)	Profit escudo
Corn/Beans	0.7					610	427	41846				19000	13300
corn grain kg		3000	2100	41									
bean grain kg		250	175	100	17500								
green fodder Pg/Un		1488	1041.6										
hay kg		6546	4582.2										
Corn Silage													
Potatoes kg	0.1	18000	1800	20	36000	716	71.6	7016.8				105100	10510
Grapes	0.2					1616	323.2	31673.6				51100	10220
white wine liters		7200	1440	36	51840								
red wine liters		1800	360	33	11880								
brandy liters		180	36	150	5400								
Mixed forage													
green fodder Pg/Un													
hay kg													
Ryegrass	0.8					480	384	37632				46400	37120
green fodder Pg/Un		6000	4800										
hay kg		7000	5600										
Pasture													
Area total ha	1												

Livestock Activity Number

	Number	unit/ha	tot.Prod.	price	Revenues	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c.	Land cost	Fix.Var.Cost	Total VarCost	Profit
Cow	2					368	736	72128				1000	2000
milk liters		1000	2000	45	90000								
beef kg													
Calf 0-6 month	1.14	300	342	508	173736	244	278.16	27259.68				1000	1140
TOTALS					386356		2219.96	217556.0	40000	91500		74290	-36990

Table A.2.- Farm accounts for 3 ha of traditional cultivated area

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost	Fix.Var.Cost esc.esc/unit	Total VarCost(esc)	Profit escudo
Corn/Beans	2.1					610	1281	125538			19000		39900
corn grain kg		3000	6300	41									
bean grain kg		250	525	100	52500								
green fodder Pg/Un		1488	3124.8										
hay kg		6546	13746.6										
Corn Silage													
Potatoes kg	0.3	18000	5400	20	108000	716	214.8	21050.4			105100		31530
Grapes	0.6					1616	969.6	95020.8			51100		30660
white vine liters		7200	4320	36	155520								
red vine liters		1800	1080	33	35640								
brandy liters		180	108	150	16200								
Mixed forage													
green fodder Pg/Un													
hay kg													
Ryegrass	2.4					480	1152	112896			46400		111360
green fodder Pg/Un		6000	14400										
hay kg		7000	16800										
Pasture													
Area total ha	3												

Livestock Activity Number													
Cow	6					368	2208	216384			1000		6000
milk liters		1000	6000	45	270000								
beef kg													
Calf 0-6 month	3.42	300	1026	508	521208	244	834.48	81779.04			1000		3420
TOTALS					1159068		6659.88	652668.2	120000	274500		222870	-11097

Table A.3.- Farm accounts for 1 ha of cultivated area - dairy system

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost	Fix.Var.Cost esc.esc/unit	Total VarCost(esc)	Profit escudo
Corn/Beans	0.7					630	441.00	43218			40000	28000	
corn grain kg		4000	2800	41									
bean grain kg		500	350	100	35000								
green fodder Pg/Un		1550	1085										
hay kg		6977	4883.9										
Corn Silage	0.0					242	0.00	0			85900	0	
silage Pg/Un		10000	0										
dry material kg		15555	0										
Potatoes kg	0.1	20000	2000	20	40000	434	43.40	4253.2			120000	12000	
Grapes	0.2					1011	202.20	19815.6			97400	19480	
white wine liters		8000	1600	36	57600								
red wine liters		2000	400	33	13200								
brandy liters		200	40	150	6000								
Mixed forage	0					60	0.00	0			27000	0	
green fodder Pg/Un		4000	0										
hay kg		6400	0										
Ryegrass	0.9					359	323.10	31663.8			25000	22500	
green fodder Pg/Un		3600	3240										
hay kg		5400	4860										
Permanent pasture	0					176.1	0.00	0			48100	0	
green fodder Pg/Un		7000	0										
hay kg		9500	0										
Area total ha	1												

Livestock Activity

Cow	2					80	160.00	15680			39200	78400	
milk liters		3400	6800	45	306000								
beef kg													
Calf 0-6 month	1.24	318	394.32	508	200314.5	72	89.28	8749.44			30600	37944	
TOTALS					658114.5		1258.98	123380	66000	91500		198324	1789

Table A.4.- Farm accounts for 3 ha of cultivated area - dairy system

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost	Fix.Var.Cost esc.esc/unit	Total VarProfit Cost(esc)escudo
Corn/Beans	0					630	0.00	0			6	0
corn grain kg		4000	0	41								
bean grain kg		500	0	100	0							
green fodder Pg/Un		1550	0									
hay kg		6977	0									
Corn silage	2.4					242	580.80	56918.4			85900	206160
silage Pg/Un		10000	24000									
dry material kg		15555	37332									
Potatoes kg	0.4	20000	8000	20	160000	575	230.00	22540			120000	48000
Grapes	0.2					1011	202.20	19815.6			97400	19480
white wine liters		8000	1600	36	57600							
red wine liters		2000	400	33	13200							
brandy liters		200	40	150	6000							
Mixed forage						60	0.00	0			27000	0
green fodder Pg/Un	0	4000	0									
hay kg		6400	0									
Ryegrass	2.8					68	168.00	16464			25000	70000
green fodder Pg/Un		3600	10080									
hay kg	0	5400	15120									
Permanent pasture						176.1	0.00	0			48100	0
green fodder Pg/Un		7000	0									
hay kg		9500	0									
Area total ha	3											

Livestock Activity Number

	Number	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost	Fix.Var.Cost esc.esc/unit	Total VarProfit Cost(esc)escudo
Cow	12					80	960.00	94080			39200	470400
milk liters		4000	48000	45	2160000							
beef kg												
Calf 0-6 month	7.44	318	2365.92	508	1201887.	72	535.68	52496.64			30600	227664
TOTALS					3598687.		2676.68	262315	936000	278500	1041704	10801

Table A.5.- Farm accounts for 5 ha of cultivated area - dairy system

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost	Fix.Var.Cost esc.esc/unit	Total Var Cost(esc)	Profit escudo
Corn/Beans	0					630	0.00	0				0	0
corn grain kg		4000	0	41									
bean grain kg		500	0	100	0								
green fodder Pg/Un		1550	0										
hay kg		6977	0										
Corn Silage	4					242	968.00	94864				85900	343600
silage Pg/Un		10000	40000										
dry material kg		15555	62220										
Potatoes kg	0.7	20000	14000	20	280000	575	402.50	39445				120000	84000
Grapes	0.3					1011	303.30	29723.4				97400	29220
white wine liters		8000	2400	36	86400								
red wine liters		2000	600	33	19800								
brandy liters		200	60	150	9000								
Mixed forage						60	0.00	0				27000	0
green fodder Pg/Un	0	4000	0										
hay kg		6400	0										
Ryegrass	4.7					60	282.00	27636				25000	117500
green fodder Pg/Un		3600	16920										
hay kg		5400	25380										
Permanent pasture	0					176.1	0.00	0				48100	0
green fodder Pg/Un		7000	0										
hay kg		9500	0										
Area total ha	5												

Livestock Activity Number													
Cow	20					80	1600.00	156800				39200	784000
milk liters		4000	80000	45	3600000								
beef kg													
Calf 0-6 month	12.4	318	3943.2	508	2003145.	72	892.80	87494.4				30600	379440

| TOTALS | | | | | 5998345. | | 4448.6 | 435963 | 1563120 | 465095 | | 1737760 | 17964 |

Table A.6.- Farm accounts for 10 ha of cultivated area - dairy system

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost esc.	Fix.Var.Cost esc/unit	Total VarCost(esc)	Profit escudc
Corn/Beans													
corn grain kg													
bean grain kg													
green fodder Pg/Un													
hay kg													
Corn Silage	6					242	1452.00	142296			85900	515400	
silage Pg/Un		10000	60000										
dry material kg		15555	93330										
Potatoes kg	0.5	18000	9000	20	180000	434	217.00	21266			120000	60000	
Grapes	0					1011	0.00	0			97400	0	
white wine liters		8000	0	36	0								
red wine liters		2000	0	33	0								
brandy liters		200	0	150	0								
Mixed forage	6.5					60	390.00	38220			27000	175500	
green fodder Pg/Un		4000	26000										
hay kg		6400	41600										
Ryegrass	0					60	0.00	0			25000	0	
green fodder Pg/Un		3600	0										
hay kg	0	5400	0										
Permanent pasture	3.5					176.1	616.35	60402.3			48100	168350	
green fodder Pg/Un		7000	24500										
hay kg		9500	33250										
Area total ha	10												

Livestock Activity	Number												
Cow	36					80	2880.00	282240			39200	1411200	
milk liters		4000	144000	45	6480000								
beef kg													
Calf 0-6 month	22.32	318	7097.76	508	3605662.	72	1607.04	157489.9			30600	682992	
TOTALS					10265662		7162.39	701914	2383300	902500		3013442	32645

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost esc.	Fix.Var.Cost esc/unit	Total VarCost(esc)	Profit escudo
Grapes	1					1011	1011.00	99078			97400	97400	
white vine liters		8500	8500	36	306000								
red vine liters		2500	2500	33	82500								
brandy liters		200	200	150	30000								
TOTALS					418500		1011	99078	98756.43	92750		97400	30515.

Table A.8.- Farm accounts for 3 ha of cultivated area - vine system

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost esc.	Fix.Var.Cost esc/unit	Total VarCost(esc)	Profit escudo
Grapes	3					1011	3033.00	297234			97400	292200	
white vine liters		8500	25500	36	918000								
red vine liters		2500	7500	33	247500								
brandy liters		200	600	150	90000								
TOTALS					1255500		3033	297234	296269.2	278250		292200	91546.

Table A.9.- Farm accounts for 5 ha of cultivated area - vine system

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost esc.	Fix.Var.Cost esc/unit	Total VarProfit Cost(esc)escudc
Grapes	5					1011	5055.00	495390			97400	487000
white vine liters		8500	42500	36	1530000							
red vine liters		2500	12500	33	412500							
brandy liters		200	1000	150	150000							
TOTALS					2092500		5055	495390	493782.1	463750		487000 152577

Table A.10.- Farm accounts for 10 ha of cultivated area - vine system

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost esc.	Fix.Var.Cost esc/unit	Total VarProfits Cost(esc)escudos
Grapes	10					1011	10110.00	990780			97400	974000
white vine liters		8500	85000	36	3060000							
red vine liters		2500	25000	33	825000							
brandy liters		200	2000	150	300000							
TOTALS					4185000		10110	990780	987564.3	927500		974000 305155.

APPENDIX B

FARM ACCOUNTS FOR EACH FAMILY TYPE AT 1986 PRICES

Table B1

Farm Accounts by farm type for family with
1200 hours at zero opportunity cost
and one hectare of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	386356	658114	418500
2. Costs of Agricultural Production Activities			
Purchased inputs	74290	198324	97400
Capital	40000	66000	98756
Labor at market wages	99960	5782	0
Land	60000	60000	60000
3. Farm Returns	172106	388008	222344
4. Net Revenue	112106	328008	162344
5. Net Revenue per hour of family labor	93.42	273.34	160.58

Table B2

Farm Accounts by farm type for family with
2400 hours at zero opportunity cost
and one hectare of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	386356	658114	418500
2. Costs of Agricultural Production Activities			
Purchased inputs	74290	198324	97400
Capital	40000	66000	98756
Labor at market wages	0	0	0
Land	60000	60000	60000
3. Farm Returns	272066	393790	222344
4. Net Revenue	212066	333790	162344
5. Net Revenue per hour of family labor	95.53	265.12	160.58

Table B3

Farm Accounts by farm type for family with
1200 hours at zero opportunity cost
and three hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	1159068	3598687	1255500
2. Costs of Agricultural Production Activities			
Purchased inputs	222870	1041704	292200
Capital	120000	936000	296269
Labor at market wages	535080	144844	179634
Land	180000	180000	180000
3. Farm Returns	281118	1476139	487397
4. Net Revenue	101118	1296139	307397
5. Net Revenue per hour of family labor	84.27	1080.12	256.16

Table B4

Farm Accounts by farm type for family with
2400 hours at zero opportunity cost
and three hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	1159068	3598687	1255500
2. Costs of Agricultural Production Activities			
Purchased inputs	222870	1041704	292200
Capital	120000	936000	296269
Labor at market wages	417480	27244	62034
Land	180000	180000	180000
3. Farm Returns	398718	1593739	604997
4. Net Revenue	218718	1413739	424997
5. Net Revenue per hour of family labor	91.13	589.06	177.08

Table B5

Farm Accounts by farm type for family with
3600 hours at zero opportunity cost
and three hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	1159068	3598687	1255500
2. Costs of Agricultural Production Activities			
Purchased inputs	222870	1041704	292200
Capital	120000	936000	296269
Labor at market wages	299880	0	0
Land	180000	180000	180000
3. Farm Returns	516318	1620983	667031
4. Net Revenue	336318	1440983	487031
5. Net Revenue per hour of family labor	93.42	538.08	160.58

Tabld B6

Farm Accounts by farm type for family with
4800 hours at zero opportunity cost
and three hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	1159068	3598687	1255500
2. Costs of Agricultural Production Activities			
Purchased inputs	222870	1041704	292200
Capital	120000	936000	296269
Labor at market wages	182280	0	0
Land	180000	180000	180000
3. Farm Returns	633918	1620983	667031
4. Net Revenue	453918	1440983	487031
5. Net Revenue per hour of family labor	94.57	538.08	160.58

Table B7

Farm Accounts by farm type for family with
7200 hours at zero opportunity cost
and three hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	1159068	3598687	1255500
2. Costs of Agricultural Production Activities			
Purchased inputs	222870	1041704	292200
Capital	120000	936000	296269
Labor at market wages	0	0	0
Land	180000	180000	180000
3. Farm Returns	816198	1620983	667031
4. Net Revenue	636198	1440983	487031
5. Net Revenue per hour of family labor	95.53	538.08	160.58

Table B8

Farm Accounts by farm type for family with
1200 hours at zero opportunity cost
and five hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	1931780	5998345	2092500
2. Costs of Agricultural Production Activities			
Purchased inputs	380870	1737760	487000
Capital	200000	1563120	493782
Labor at market wages	970200	318402	377790
Land	300000	300000	300000
3. Farm Returns	380710	2379063	733928
4. Net Revenue	80710	2079063	433928
5. Net Revenue per hour of family labor	67.26	1732.55	361.61

Table B9

Farm Accounts by farm type for family with
2400 hours at zero opportunity cost
and five hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	1931780	5998345	2092500
2. Costs of Agricultural Production Activities			
Purchased inputs	380870	1737760	487000
Capital	200000	1563120	493782
Labor at market wages	852600	200802	260190
Land	300000	300000	300000
3. Farm Returns	498310	2496663	851528
4. Net Revenue	198310	2196663	551528
5. Net Revenue per hour of family labor	82.63	915.28	229.80

Table B10

Farm Accounts by farm type for family with
3600 hours at zero opportunity cost
and five hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	1931780	5998345	2092500
2. Costs of Agricultural Production Activities			
Purchased inputs	380870	1737760	487000
Capital	200000	1563120	493782
Labor at market wages	735000	83202	142590
Land	300000	300000	300000
3. Farm Returns	·615910	2614263	969128
4. Net Revenue	315910	2314263	669128
5. Net Revenue per hour of family labor	87.75	642.85	185.87

Table B11

Farm Accounts by farm type for family with
4800 hours at zero opportunity cost
and five hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	1931780	5998345	2092500
2. Costs of Agricultural Production Activities			
Purchased inputs	380870	1737760	487000
Capital	200000	1563120	493782
Labor at market wages	617400	0	24990
Land	300000	300000	300000
3. Farm Returns	733510	2697465	1086728
4. Net Revenue	433510	2397465	786728
5. Net Revenue per hour of family labor	90.31	538.88	163.90

Table B12

Farm Accounts by farm type for family with
7200 hours at zero opportunity cost
and five hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	1931780	5998345	2092500
2. Costs of Agricultural Production Activities			
Purchased inputs	380870	1737760	487000
Capital	200000	1563120	493782
Labor at market wages	382200	0	0
Land	300000	300000	300000
3. Farm Returns	968710	2697465	1111718
4. Net Revenue	668710	2397465	811718
5. Net Revenue per hour of family labor	92.88	538.88	160.58

Table B13

Farm Accounts by farm type for family with 1200 hours at zero opportunity cost and ten hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	3863560	10265662	4185000
2. Costs of Agricultural Production Activities			
Purchased inputs	766450	3013442	974000
Capital	400000	2383300	987564
Labor at market wages	2058000	584276	873180
Land	600000	600000	600000
3. Farm Returns	639110	4284644	1350256
4. Net Revenue	39110	3684644	750256
5. Net Revenue per hour of family labor	32.59	3070.54	625.21

Table B14

Farm Accounts by farm type for family with 2400 hours at zero opportunity cost and ten hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	3863560	10265662	4185000
2. Costs of Agricultural Production Activities			
Purchased inputs	766450	3013442	974000
Capital	400000	2383300	987564
Labor at market wages	1940400	466676	755580
Land	600000	600000	600000
3. Farm Returns	756710	4402244	1467856
4. Net Revenue	156710	3802244	867856
5. Net Revenue per hour of family labor	65.30	1584.27	361.61

Table B15

Farm Accounts by farm type for family with
3600 hours at zero opportunity cost
and ten hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	3863560	10265662	4185000
2. Costs of Agricultural Production Activities			
Purchased inputs	766450	3013442	974000
Capital	400000	2383300	987564
Labor at market wages	1822800	349076	637980
Land	600000	600000	600000
3. Farm Returns	874310	4519844	1585456
4. Net Revenue	274310	3919844	985456
5. Net Revenue per hour of family labor	76.20	1088.85	273.74

Table B16

Farm Accounts by farm type for family with
4800 hours at zero opportunity cost
and ten hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	3863560	10265662	4185000
2. Costs of Agricultural Production Activities			
Purchased inputs	766450	3013442	974000
Capital	400000	2383300	987564
Labor at market wages	1705200	231476	520380
Land	600000	600000	600000
3. Farm Returns	991910	4637444	1703056
4. Net Revenue	391910	4037444	1103056
5. Net Revenue per hour of family labor	81.65	841.13	229.80

Table B17
Farm Accounts by farm type for family with
7200 hours at zero opportunity cost
and ten hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	3863560	10265662	4185000
2. Costs of Agricultural Production Activities			
Purchased inputs	766450	3013442	974000
Capital	400000	2383300	987564
Labor at market wages	1470000	0	285180
Land	600000	600000	600000
3. Farm Returns	1227110	4868920	1938256
4. Net Revenue	627110	4268920	1338256
5. Net Revenue per hour of family labor	87.10	596.05	185.87

APPENDIX C

FARM ACCOUNTS FOR EACH FAMILY TYPE CONSIDERING

CHANGES IN OUTPUT PRICES

FARM ACCOUNTS FOR ZERO LABOR HOURS AT ZERO OPPORTUNITY COST

Table C.1.- Farm accounts for 1 ha of traditional cultivated area

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost esc.	Fix.Var.Cost esc/unit	Total VarCost(esc)	Profits escudos
Corn/Beans	0.7					610	427	50386			19000	13300	
corn grain kg		3000	2100	41									
bean grain kg		250	175	100	17500								
green fodder Pg/Un		1400	1041.6										
hay kg		6546	4502.2										
Corn Silage													
Potatoes kg	0.1	18000	1800	20	36000	716	71.6	8448.8			105100	10510	
Grapes	0.2					1616	323.2	38137.6			51100	10220	
white vine liters		7200	1440	37	53280								
red vine liters		1800	360	34	12240								
brandy liters		180	36	150	5400								
Mixed forage													
green fodder Pg/Un													
hay kg													
Ryegrass	0.8					480	384	45312			46400	37120	
green fodder Pg/Un		6000	4800										
hay kg		7000	5600										
Pasture													
Area total ha	1												

Livestock Activity Number													
Cow	2					368	736	86848			1000	2000	
milk liters		1000	2000	30	60000								
beef kg													
Calf 0-6 month	1.14	300	342	431	147402	244	278.16	32822.88			1000	1140	

| TOTALS | | | | | 331822 | | 2219.96 | 261955.2 | 40000 | 91500 | 74290 | -135923 | |

Table C.2.- Farm accounts for 3 ha of traditional cultivated area

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost	Fix.Var.Cost esc.esc/unit	Total VarProfit: Cost(esc)escudos
Corn/Beans	2.1					610	1281	151158			19000	39900
corn grain kg		3000	6300	41								
bean grain kg		250	525	100	52500							
green fodder Pg/Un		1488	3124.8									
hay kg		6546	13746.6									
Corn Silage												
Potatoes kg	0.3	18000	5400	20	108000	716	214.8	25346.4			105100	31530
Grapes	0.6					1616	969.6	114412.8			51100	30660
white wine liters		7200	4320	37	159840							
red wine liters		1800	1080	34	36720							
brandy liters		180	108	150	16200							
Mixed forage												
green fodder Pg/Un												
hay kg												
Ryegrass	2.4					480	1152	135936			46400	111360
green fodder Pg/Un		6000	14400									
hay kg		7000	16800									
Pasture												
Area total ha	3											

Livestock Activity Number												
Cow	6					368	2208	260544			1000	6000
milk liters		1000	6000	30	180000							
beef kg												
Calf 0-6 month	3.42	300	1026	431	442206	244	834.48	98468.64			1000	3420

| TOTALS | | | | | 995466 | | 6659.88 | 785865.8 | 120000 | 274500 | 222870 | -40776 |

Table C.3.- Farm accounts for 1 ha of cultivated area - dairy system

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost	Fix.Var.Cost esc.esc/unit	Total VarCost(esc)	Profit: escudo:
Corn/Beans	0.7					630	441.00	52038			40000	28000	
corn grain kg		4000	2800	41									
bean grain kg		500	350	100	35000								
green fodder Pg/Un		1550	1085										
hay kg		6977	4883.9										
Corn Silage	0.0					242	0.00	0			85900	0	
silage Pg/Un		10000	0										
dry material kg		15555	0										
Potatoes kg	0.1	20000	2000	20	40000	434	43.40	5121.2			120000	12000	
Grapes	0.2					1011	202.20	23859.6			97400	19480	
white vine liters		8000	1600	37	59200								
red vine liters		2000	400	34	13600								
brandy liters		200	40	150	6000								
Mixed forage	0					60	0.00	0			27000	0	
green fodder Pg/Un		4000	0										
hay kg		6400	0										
Ryegrass	0.9					359	323.10	38125.8			25000	22500	
green fodder Pg/Un		3600	3240										
hay kg		5400	4860										
Permanent pasture	0					176.1	0.00	0			48100	0	
green fodder Pg/Un		7000	0										
hay kg		9500	0										
Area total ha	1												
Livestock Activity													
Cow	2					80	160.00	18880			39200	78400	
milk liters		3400	6800	30	204000								
beef kg													
Calf 0-6 month	1.24	318	394.32	431	169951.9	72	89.28	10535.04			30600	37944	
TOTALS					527751.9		1258.98	148560	66000	91500		198324	233

Table C.4.- Farm accounts for 3 ha of cultivated area - dairy system

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost esc.	Fix.Var.Cost esc/unit	Total Var Cost(esc)	Profit escudo
Corn/Beans	0					630	0.00	0				0	0
corn grain kg		4000	0	41									
bean grain kg		500	0	100	0								
green fodder Pg/Un		1550	0										
hay kg		6977	0										
Corn silage	2.4					242	580.80	68534.4			85900	206160	
silage Pg/Un		10000	24000										
dry material kg		15555	37332										
Potatoes kg	0.4	20000	8000	20	160000	575	230.00	27140			120000	48000	
Grapes	0.2					1021	202.20	23059.6			97400	19480	
white vine liters		8000	1600	37	59200								
red vine liters		2000	400	34	13600								
brandy liters		200	40	150	6000								
Mixed forage						60	0.00	0			27000	0	
green fodder Pg/Un	0	4000	0										
hay kg		6400	0										
Ryegrass	2.8					60	168.00	19824			25000	70000	
green fodder Pg/Un		3600	10080										
hay kg	0	5400	15120										
Permanent pasture						176.1	0.00	0			48100	0	
green fodder Pg/Un		7000	0										
hay kg		9500	0										
Area total ha	3												

Livestock Activity Number

	Number	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost esc.	Fix.Var.Cost esc/unit	Total Var Cost(esc)	Profit escudo
Cow	12					80	960.00	113280			39200	470400	
milk liters		4000	48000	30	1440000								
beef kg													
Calf 0-6 month	7.44	318	2365.92	431	1019711.	72	535.68	63210.24			30600	227664	
TOTALS					2698511.		2676.68	315848	936000	278500		1041704	1264

Table C.5.- Farm accounts for 5 ha of cultivated area - dairy system

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost	Fix.Var.Cost esc.esc/unit	Total VarCost(esc)	Profit escudo
Corn/Beans	0					630	0.00	0				0	0
corn grain kg		4000	0	41									
bean grain kg		500	0	100	0								
green fodder Fg/Un		1550	0										
hay kg		6977	0										
Corn silage	4					242	968.00	114224				85900	343600
silage Fg/Un		10000	40000										
dry material kg		15555	62220										
Potatoes kg	0.7	20000	14000	20	280000	575	402.50	47495				120000	84000
Grapes	0.3					1011	303.30	35789.4				97400	29220
white wine liters		8000	2400	37	88800								
red wine liters		2000	600	34	20400								
brandy liters		200	60	150	9000								
Mixed forage						60	0.00	0				27000	0
green fodder Fg/Un	0	4000	0										
hay kg		6400	0										
Ryegrass	4.7					60	282.00	33276				25000	117500
green fodder Fg/Un		3600	16920										
hay kg		5400	25380										
Permanent pasture	0					176.1	0.00	0				48100	0
green fodder Fg/Un		7000	0										
hay kg		9500	0										
Area total ha	5												

Livestock Activity Number

	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost	Fix.Var.Cost esc.esc/unit	Total VarCost(esc)	Profit escudo
Cow	20					80	1600.00	188890				39200	784000
milk liters		4000	80000	30	2400000								
beef kg													
Calf 0-6 month	12.4	310	3943.2	431	1699519.	72	892.80	105350.4				30600	379440
TOTALS					4497719.		4448.6	524935	1563120	465095		1737760	2068

Table C.6.- Farm accounts for 10 ha of cultivated area - dairy system

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost	Fix.Var.Cost esc.esc/unit	Total VarCost(esc)	Profit escudo
Corn/Beans													
corn grain kg													
bean grain kg													
green fodder Fg/Un													
hay kg													
Corn Silage	6					242	1452.00	171336			85900	515400	
silage Fg/Un		10000	60000										
dry material kg		15555	93330										
Potatoes kg	0.5	18000	9000	20	180000	434	217.00	25606			120000	60000	
Grapes	0					1011	0.00	0			97400	0	
white wine liters		8000	0	37	0								
red wine liters		2000	0	34	0								
brandy liters		200	0	150	0								
Mixed forage	6.5					60	390.00	46020			27000	175500	
green fodder Fg/Un		4000	26000										
hay kg		6400	41600										
Ryegrass	0					60	0.00	0			25000	0	
green fodder Fg/Un		3600	0										
hay kg	0	5400	0										
Permanent pasture	3.5					176.1	616.35	72729.3			48100	168350	
green fodder Fg/Un		7000	24500										
hay kg		9500	33250										
Area total ha	10												

Livestock Activity Number													
Cow	36					80	2880.00	339840			39200	1411200	
milk liters		4000	144000	30	4320000								
beef kg													
Calf 0-6 month	22.32	318	7097.76	431	3059134.	72	1607.04	189630.7			30600	682992	

| TOTALS | | | | | 7559134. | | 7162.39 | 845162 | 2383300 | 902500 | | 3013442 | 4147 |

Table C.7.- Farm accounts for 1 ha of cultivated area - vine system

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost esc.	Fix.Var.Cost esc/unit	Total Var Cost(esc)	Profit escudo
Grapes	1					1011	1011.00	119298			97400	97400	
white vine liters		8500	8500	37	314500								
red vine liters		2500	2500	34	85000								
brandy liters		200	200	150	30000								
TOTALS					429500		1011	119298	98756.43	92750		97400	21295.

Table C.8.- Farm accounts for 3 ha of cultivated area - vine system

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost esc.	Fix.Var.Cost esc/unit	Total Var Cost(esc)	Profits escudos
Grapes	3					1011	3033.00	357894			97400	292200	
white vine liters		8500	25500	37	943500								
red vine liters		2500	7500	34	255000								
brandy liters		200	600	150	90000								
TOTALS					1288500		3033	357894	296269.2	278250		292200	63886.7

Table C.10.- Farm accounts for 10 ha of cultivated area - vine system

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost esc.	Fix.Var.Cost esc/unit	Total VarCost(esc)	Profit escudo
Grapes	10					1011	10110.00	1192980			97400	974000	
white vine liters		8500	85000	37	3145000								
red vine liters		2500	25000	34	850000								
brandy liters		200	2000	150	300000								
TOTALS					4295000		10110	1192980	987564.3	927500		974000	212955

Table C.9.- Farm accounts for 5 ha of cultivated area - vine system

Crop Activities	Area ha	unit/ha	tot.Prod.	price esc/un.	Revenues escudos	Labor hrs/unit	Total lab hours	Labor Cost esc.	Fixed c. esc.	Land cost esc.	Fix.Var.Cost esc/unit	Total VarCost(esc)	Profit escudo
Grapes	5					1011	5055.00	596490			97400	487000	
white vine liters		8500	42500	37	1572500								
red vine liters		2500	12500	34	425000								
brandy liters		200	1000	150	150000								
TOTALS					2147500		5055	596490	493782.1	463750		487000	106477

FARM ACCOUNTS FOR 1,200, 2,400, 3,600 4,800 AND 7,200 LABOR

HOURS AT ZERO OPPORTUNITY COST

Table C.11

Farm Accounts by farm type for family with
1200 hours at zero opportunity cost
and one hectare of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	331822	527752	429500
2. Costs of Agricultural Production Activities			
Purchased inputs	74290	198324	97400
Capital	40000	66000	98756
Labor at market wages	120360	6962	0
Land	60000	60000	60000
3. Farm Returns	97172	256466	233344
4. Net Revenue	37172	196466	173344
5. Net Revenue per hour of family labor	30.98	163.72	171.46

Table C.12

Farm Accounts by farm type for family with
2400 hours at zero opportunity cost
and one hectare of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	331822	527752	429500
2. Costs of Agricultural Production Activities			
Purchased inputs	74290	198324	97400
Capital	40000	66000	98756
Labor at market wages	0	0	0
Land	60000	60000	60000
3. Farm Returns	217532	263428	233344
4. Net Revenue	157532	203428	173344
5. Net Revenue per hour of family labor	70.96	161.58	171.46

Table C.13

Farm Accounts by farm type for family with
1200 hours at zero opportunity cost
and three hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	995466	2698511	1288500
2. Costs of Agricultural Production Activities			
Purchased inputs	222870	1041704	292200
Capital	120000	936000	296269
Labor at market wages	644280	174404	216294
Land	180000	180000	180000
3. Farm Returns	8316	546403	483737
4. Net Revenue	-171684	366403	303737
5. Net Revenue per hour of family labor	-143.07	305.34	253.11

Table C.14

Farm Accounts by farm type for family with
2400 hours at zero opportunity cost
and three hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	995466	2698511	1288500
2. Costs of Agricultural Production Activities			
Purchased inputs	222870	1041704	292200
Capital	120000	936000	296269
Labor at market wages	502680	32804	74694
Land	180000	180000	180000
3. Farm Returns	149916	688003	625337
4. Net Revenue	-30084	508003	445337
5. Net Revenue per hour of family labor	-12.54	211.67	185.56

Table C.15

Farm Accounts by farm type for family with
3600 hours at zero opportunity cost
and three hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	995466	2698511	1288500
2. Costs of Agricultural Production Activities			
Purchased inputs	222870	1041704	292200
Capital	120000	936000	296269
Labor at market wages	361080	0	0
Land	180000	180000	180000
3. Farm Returns	291516	720807	700031
4. Net Revenue	111516	540807	520031
5. Net Revenue per hour of family labor	30.98	201.94	171.46

Table C.16

Farm Accounts by farm type for family with
4800 hours at zero opportunity cost
and three hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	995466	2698511	1288500
2. Costs of Agricultural Production Activities			
Purchased inputs	222870	1041704	292200
Capital	120000	936000	296269
Labor at market wages	219480	0	0
Land	180000	180000	180000
3. Farm Returns	433116	720807	700031
4. Net Revenue	253116	540807	520031
5. Net Revenue per hour of family labor	52.73	201.94	171.46

Table C.17

Farm Accounts by farm type for family with
7200 hours at zero opportunity cost
and three hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	995466	2698511	1288500
2. Costs of Agricultural Production Activities			
Purchased inputs	222870	1041704	292200
Capital	120000	936000	296269
Labor at market wages	0	0	0
Land	180000	180000	180000
3. Farm Returns	652596	720807	700031
4. Net Revenue	472596	540807	520031
5. Net Revenue per hour of family labor	70.96	201.94	171.46

Table C.18

Farm Accounts by farm type for family with
1200 hours at zero opportunity cost
and five hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	1931780	4497719	2147500
2. Costs of Agricultural Production Activities			
Purchased inputs	380870	1737760	487000
Capital	200000	1563120	493782
Labor at market wages	1168200	383382	454890
Land	300000	300000	300000
3. Farm Returns	182710	813457	711828
4. Net Revenue	-117290	513457	411828
5. Net Revenue per hour of family labor	-97.74	427.88	343.19

Table C.19

Farm Accounts by farm type for family with
2400 hours at zero opportunity cost
and five hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	1931780	4497719	2147500
2. Costs of Agricultural Production Activities			
Purchased inputs	380870	1737760	487000
Capital	200000	1563120	493782
Labor at market wages	1026600	241782	313290
Land	300000	300000	300000
3. Farm Returns	324310	955057	853428
4. Net Revenue	24310	655057	553428
5. Net Revenue per hour of family labor	10.13	272.94	230.60

Table C.20

Farm Accounts by farm type for family with
3600 hours at zero opportunity cost
and five hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	1931780	4497719	2147500
2. Costs of Agricultural Production Activities			
Purchased inputs	380870	1737760	487000
Capital	200000	1563120	493782
Labor at market wages	885000	100182	171690
Land	300000	300000	300000
3. Farm Returns	465910	1096657	995028
4. Net Revenue	165910	796657	695028
5. Net Revenue per hour of family labor	46.09	221.29	193.06

Table C.19

Farm Accounts by farm type for family with
4800 hours at zero opportunity cost
and five hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	1931780	4497719	2147500
2. Costs of Agricultural Production Activities			
Purchased inputs	380870	1737760	487000
Capital	200000	1563120	493782
Labor at market wages	743400	0	30090
Land	300000	300000	300000
3. Farm Returns	607510	1196839	1136628
4. Net Revenue	307510	896839	836628
5. Net Revenue per hour of family labor	64.06	201.58	174.30

Table C.20

Farm Accounts by farm type for family with
7200 hours at zero opportunity cost
and five hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	1931780	4497719	2147500
2. Costs of Agricultural Production Activities			
Purchased inputs	380870	1737760	487000
Capital	200000	1563120	493782
Labor at market wages	460200	0	0
Land	300000	300000	300000
3. Farm Returns	890710	1196839	1166718
4. Net Revenue	590710	896839	866718
5. Net Revenue per hour of family labor	82.04	201.58	171.46

Table C.21

Farm Accounts by farm type for family with
1200 hours at zero opportunity cost
and ten hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	3863560	7559134	4295000
2. Costs of Agricultural Production Activities			
Purchased inputs	766450	3013442	974000
Capital	400000	2383300	987564
Labor at market wages	2478000	703516	1051380
Land	600000	600000	600000
3. Farm Returns	219110	1458876	1282056
4. Net Revenue	-380890	858876	682056
5. Net Revenue per hour of family labor	-317.41	715.73	568.38

Farm Accounts by farm type for family with
2400 hours at zero opportunity cost
and ten hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	3863560	7559134	4295000
2. Costs of Agricultural Production Activities			
Purchased inputs	766450	3013442	974000
Capital	400000	2383300	987564
Labor at market wages	2336400	561916	909780
Land	600000	600000	600000
3. Farm Returns	360710	1600476	1423656
4. Net Revenue	-239290	1000476	823656
5. Net Revenue per hour of family labor	-99.70	416.87	343.19

Table C.22

Farm Accounts by farm type for family with 3600 hours at zero opportunity cost and ten hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	3863560	7559134	4295000
2. Costs of Agricultural Production Activities			
Purchased inputs	766450	3013442	974000
Capital	400000	2383300	987564
Labor at market wages	2194800	420316	768180
Land	600000	600000	600000
3. Farm Returns	502310	1742076	1565256
4. Net Revenue	-97690	1142076	965256
5. Net Revenue per hour of family labor	-27.14	317.24	268.13

Farm Accounts by farm type for family with 4800 hours at zero opportunity cost and ten hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	3863560	7559134	4295000
2. Costs of Agricultural Production Activities			
Purchased inputs	766450	3013442	974000
Capital	400000	2383300	987564
Labor at market wages	2053200	278716	626580
Land	600000	600000	600000
3. Farm Returns	643910	1883676	1706856
4. Net Revenue	43910	1283676	1106856
5. Net Revenue per hour of family labor	9.15	267.43	230.60

Table C.23

Farm Accounts by farm type for family with
7200 hours at zero opportunity cost
and ten hectares of land.

	Traditional	Dairy	Wine
1. Agricultural Revenues	3863560	7559134	4295000
2. Costs of Agricultural Production Activities			
Purchased inputs	766450	3013442	974000
Capital	400000	2383300	987564
Labor at market wages	1770000	0	343380
Land	600000	600000	600000
3. Farm Returns	927110	2162392	1990056
4. Net Revenue	327110	1562392	1390056
5. Net Revenue per hour of family labor	45.43	218.15	193.06

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