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TECHNICAL AND STRUCTURAL DEVELOPMENTS IN SPAIN'S DAIRY SECTOR:
IMPLICATIONS FOR ENTRY INTO THE COMMON MARKET

by

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Technical and Structural Developments in Spain's Dairy Sector:
Implications for Entry into the Common Market

A.C. Herruzo and J.W. Hammond

ABSTRACT

This paper outlines the major trends experienced by Spain's dairy sector in recent decades. It offers tentative explanations of the factors accounting for these observed trends. Implications for the nation's dairy farm sector from entry into the EEC are examined. The paper concludes with some considerations on the possibilities to carry out the necessary technical and structural reforms needed to achieve a viable dairy sector before full application of the mechanisms for the Community's dairy policy takes place.

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INTRODUCTION

Spain's dairy industry has undergone significant changes in recent decades. Total milk production increased 61 percent and milk production per cow increased 42 percent from 1966 to 1986. Dairy farm numbers have declined but the average herd size has increased. Major improvements have been made in techniques of milk production and handling. This progress was accelerated by establishment of national programs in 1966 to encourage development of the dairy industry, price supports and technical assistance for dairy farms. This system of programs and controls has been dramatically changed with Spain's entry into the European Economic Community (EEC) in 1986. The purpose of this paper is to trace the development of Spain's dairy industry since 1966 and to examine some of the implications for its industry from entry into the EEC.

RECENT TRENDS IN DAIRY PRODUCTION

In 1986, milk production accounted for 9.5 percent of the total value of Spain's final agricultural production and 17.4 of the total value of the country's livestock production (Ministerio 1986b). The importance of dairy farming in the agricultural economy of Spain extends beyond those figures in several regions. More than half of the country's milk production comes from the northern coastal regions of Galicia, Asturias, Cantabria, and the Basque country (see Figure 1 and Table 1). In these major producing areas, milk output comprises from 20 to more than 40 percent of total agricultural output (Ministerio 1985). Spain's dairy sector provides live animals, meat and other dairy cattle products whose value adds substantially to agricultural output.

Milk production increased from 3.71 million metric tons in 1966 to

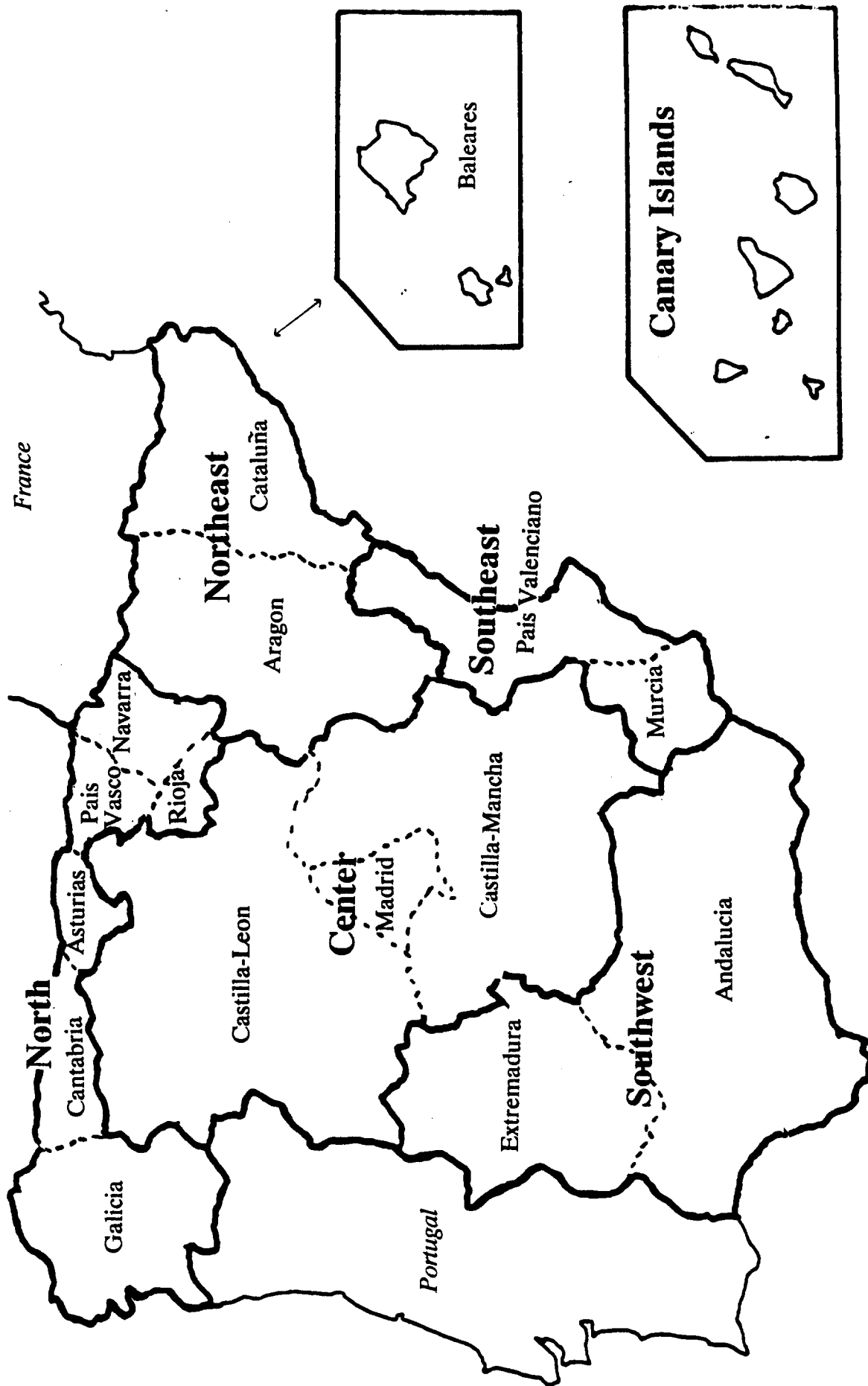


Figure 1. Large Dairy Production Areas

6.97 million metric tons in 1986, a 62 percent increase (see Table 2). This was achieved with only a 13 percent increase in cow numbers. In fact, cow numbers reached a peak of 1.96 million head in 1982, and in 1986, were at the same level as in 1969 (Table 2). Annual milk production per cow has increased from 2343 liters in 1966 to 3323 liters in 1986, a 42 percent increase.

The number of dairy farmers in Spain surpasses 200,000 and in some areas of the country, dairy is the major and sometimes the only viable agricultural activity. Furthermore, milk is an important raw material input for more than 500 dairy processing firms (Ministerio 1987 a). Milk producers are a market for a wide range of inputs and services.

The government implemented major dairy policies in 1966. Since then, five major trends can be discerned in Spain's dairy economy:

- a) A continuous increase in production;
- b) A fairly constant number of cows;
- c) A significant increase in average production per cow;
- d) A steady decrease in the number of dairy farms;
- e) A diversification of production across the country.

The large increase in milk production which has taken place has been induced by a system of guaranteed prices established in 1966 under legislation entitled, "Reglamento de Centrales Lecheras y Otras Industria Lacteas." This was the first national program to regulate dairy prices and market organization in Spain (Decreto 2478/66). Between 1966 and 1986, the year Spain became a member of the EEC, government intervention in the dairy sector has been based on the maintenance of minimum prices at which milk

could be purchased from dairy farmers. These minimum prices varied by province to allow the movement of milk from surplus to deficit

Table 1. Milk Production and Yields by Regions in 1985 (kg/cow)

Region	Percent of National Milk Production	Milk Yields (kg/cow)
North	51.7	2,813
Northeast	13.3	4,154
Center	22.9	3,733
Southwest	9.2	3,687
Southeast	1.32	4,840
Canary Islands	.58	3,232
SPAIN	100.0	3,232

Source: Ministerio 1985

regions. Target and upper intervention prices, and a maximum retail price were also established. To protect the interior market from external competition, the government has controlled foreign trade for most dairy products through different schemes -- quotas, state trade, etc. (FORPPA 1986).

The expansion in milk production has been accompanied by a parallel movement in the demand for milk and dairy products. It increased for fresh dairy products from 60 kg per capita in 1966 to 110 kg per capita in 1985. However, with the increase in production, by 1986 Spain was close to self-sufficient in dairy products, with the exceptions of cheese and milk powder for animal consumption. It encountered some seasonal surpluses of milk (Ministerio 1985).

The increase in milk production experienced in Spain from 1966 to 1985 took place despite a reduction in real milk prices during the same period. It occurred because of increases in productivity which led to a reduction in production costs large enough to offset the declining real prices. The real average milk price received by dairy producers declined from 5.6 pesetas/liter in 1966 to 3.1 pesetas/liter in 1986. While in the same period, production increased from 3.7 million tonnes to 6.0 million tonnes (see Table 2).

As noted above, the number of dairy cows has remained fairly stable throughout the years (in particular since 1970), at about 1.8 million cows. Thus, the increase in milk production must be attributed to improved milk yields per cow. On average, cow yields increased almost 50 percent from 2,343 liters per cow year in 1966, to 3,323 liters per year in 1986 (See Table 2). These important gains in productivity were made possible because of technological advances in the form of new and improved inputs, modern production techniques and better management practices and because of important structural adjustments at the farm level. The latter have resulted in an increase in the size of the dairy enterprises and in a reduction in the number of dairy farms. The trend toward less but larger herd size was induced to a larger extent by the ongoing process of technical change. It was re-enforced by specific structural measures by the government, as well as by the existence of alternative economic opportunities to dairy farming - at least until the mid-seventies.

One last change has characterized the evolution of Spain's dairy sector in recent decades. This is the diversification of milk production

across the country. Traditionally, milk production has taken place in the most naturally favored regions of the northern coast. But today,

Table 2. Spain's Milk Production. Cow Numbers. Milk Yields. Producer's Real Prices and Milk to Feed Ratios. Selected Years

Year	Milk production (mill. tonnes)	Numbers of dairy cows (millions)	Milk yields per cow (liters)	Producers real milk prices (pesetas/liter)	Milk/feed price ratio
1966	3.708	1.583	2,343	5.4	0.91
1967	3.728	1.653	2,135	5.26	0.91
1968	4.014	1.702	2,359	5.02	0.91
1969	4.296	1.789	2,403	4.92	0.90
1970	4.321	1.827	2,366	4.99	0.95
1971	4.262	1.861	2,289	5.11	0.99
1972	4.511	1.870	2,413	5.35	1.09
1973	4.792	1.935	2,476	4.82	0.98
1974	4.931	1.852	2,662	4.77	0.93
1975	4.984	1.811	2,428	4.92	1.09
1976	5.212	1.822	2,861	4.8	1.13
1977	5.354	1.950	2,795	4.31	1.12
1978	5.560	1.950	2,867	3.94	1.11
1979	5.661	1.810	3,128	2.72	1.14
1980	5.871	1.856	3,170	3.52	1.15
1981	5.881	1.853	3,173	3.37	1.02
1982	5.947	1.958	2,828	3.21	1.02
1983	6.070	1.881	3,227	3.15	1.00
1984	6.244	1.882	3,309	3.24	0.92
1985	6.112	1.890	3,232	3.24	1.01
1986	5.972	1.786	3,323	3.11	0.99

Source: Ministerio 1985 and other years

although the bulk of milk collected is still concentrated in that region, milk production is dispersed throughout the country. Several factors have accounted for this shift in milk production. The inefficient structure of the dairy farming sector in the traditional regions of the country has made profitable the establishment of new and more intensive dairy enterprises in other regions of the country. In addition, there was the adoption of policy measures to protect the interior market from foreign competition and the establishment of guaranteed prices by region, which have favored

deficit regions. All have also worked to re-enforce the process of regional diversification in milk production. As a result, milk production has shifted from very small farm holdings located in the north, which are largely based on grazing techniques, to larger and more intensive enterprises heavily dependent on the feeding of concentrates which are located in the irrigated areas of the interior and south of the country (Tio 1986). An additional factor contributing to this shift has been the favorable price ratio of milk to feed concentrates during this period (see Table 2).

The process of technical and structural change undergone by Spain's dairy sector during the last twenty years has generated significant increases in milk yields per cow. For the period 1966-1986, the increase was slightly higher than experienced in the "old" EEC as a whole. Nevertheless, Spain's average milk production per cow in 1986 was only 76.2 percent of that of the Community (Table 3). Though these figures show an improvement since 1966 when Spain's milk yield was only 72.3 percent of that of the Community, they placed Spain, at the time of accession to the EEC, in a very unfavorable competitive position with respect to most other community members (Table 3).¹

In the following sections of this paper, the principal technical and structural developments responsible for the recent evolution of the country's dairy sector are described in detail. This is followed by a discussion of the entry of Spain's dairy sector into the EEC dairy market

¹For a more detailed comparison of Spain's dairy sector with that of some other EEC countries, see C.N.I.E.L. L'Economie Laitier in Chiffres, Paris 1986, and United Kingdom Milk Marketing Board, United Kingdom Dairy Facts and Figures, Thames Ditton, Surrey, 1987.

Table 3. Select Dairy Statistics - EEG-12

	Dairy Herd 1986	Produc of milk from dairy herds	Yields of all cows	% of recorded cows	Yields of re- corded	Ave. # of animals per holding	% of cows
Belgium	951	3,296	4,120	29.1	4,802	21.2	55
Denmark	913	5,099	5,598	72.8	6,014	28.2	105
France	6,506	27,790	4,304	35.6	5,202	19.8	91
Germany (W.)	5,451	25,676	4,834	52.0	5,357	15.1	98
Greece	219	660	3,196	-	-	3	-
Italy	3,075	10,946	3,467	25.2	5,410	9.1	41
Ireland	1,528	5,823	3,670	7.0	5,088	19.1	67
Luxembourg	70	301	4,271	29.0	4,879	30.7	-
Netherlands	2,333	12,550	5,441	76.3	5,870	39.4	70
United Kingdom	3,252	16,077	4,958	50.6	5,607	61.6	52
EC-10			4,505	-		17.8	
Portugal	-	1,050	-	13.9	4,489	-	
Spain	1,805	6,375	3,343	2.9	5,780	6-8	61

Source: Eurostat., 1986; the Agricultural Situation in the Community, 1987,1988.

organization. In section 5, the transition period to the full application of the Community's dairy policy in Spain is considered. In the last section, the potential consequences for the country's dairy sector are assessed.

IMPROVEMENTS IN MILK PRODUCTION

Genetic Improvements and Stock Selection

Spain's dairy herd has undergone a continual process of breed substitution from low-yield, dual purpose breeds toward higher yield, more specialized milk production breeds². The predominant breed in Spain today is the European Black and White Friesian which in 1986 comprised almost 70

² For a detailed description of dairy breeds in Spain, see A. Sanchez Belda. Razas Bovinas Españolas. Ministerio de Agricultura Pesca y Alimentacion. Madrid, 1984.

percent of the nation's dairy herd and 51 percent of the country's total cow population, compared to 35 and 26 percent in 1966 (see Table 4).

The degree of milk specialization of Spain's dairy herd has been re-enforced in recent years by the replacement of European Friesian cows with the Holstein-Friesian strains from U.S.A. and Canada (Calcedo 1983). In 1981, more than 60 percent of the bulls used for artificial insemination were of North American origin. The penetration of holstein genes is also taking place through bulls imported from other European countries where

Table 4. Number of Dairy Cows by Breed in Selected Years (Thousands)

Breed	1966	1970	1974	1978	1982	1986
Friesian	560	774	935	1,044	1,168	1,374
Brown Alpine	109	154	192	229	195	192
Other Breeds	143	167	720	677	516	420
Cross Breeds	771	732				
All Dairy Cows	1,583	1,827	1,852	1,950	1,853	1,786
All Cows	2,108	2,393	2,424	2,552	2,485	2,670

Source: Ministerio 1985 and other years

the introduction of the holstein strain is also significant (Alberro 1982). The North-American Holstein is highly specialized for milk production. Thus, it is widely accepted among many Spanish dairy farmers for whom milk cash receipts represent a daily wage. On the other hand, the American Holstein is considered to be a poorer producer of beef in quantity and quality and it also seems to show a poorer reproductive efficiency (Allen et. al. 1982, Calcedo 1980). These characteristics have raised questions about the ultimate consequences of the process of "holsteinization" of

Spain's dairy herd with respect to maintaining an appropriate balance between milk and beef production (Calcedo 1983).

The second most important dairy breed in Spain (9.6 percent of the dairy herd) is the Parda Alpina (Brown Alpine), a strain related to the Brown Swiss. Although less specialized in milk production, the Parda Alpina is a dual purpose - milk and beef - breed with lower milk yields than the Friesian, about 33 percent (Table 5), but with a higher efficiency in beef production and a good capability to adjust to certain mountain regions of the country. These characteristics have allowed this breed to double in number since 1966, largely by replacing local breeds in those mountainous areas. However, the number of Parda Alpina cows has decreased slightly in recent years because of the competition from newly introduced German breeds such as Fleckvieh or Simmental which adjust well to the same

Table 5. Average Yields per Recorded Cow by Breed in Selected Years (kg)

Breed	1981	1984	1985
Friesian	5,450	5,836	5,850
Brown Alpine	4,266	4,443	4,526
Fleckvieh	4,245	4,253	4,553

Source: Federation Nationale des Organismes de Controle Laitier, 1987

areas of the country (Rodríguez 1986). The remainder of the nation's dairy herd, about 20 percent, is comprised of local breeds, mainly Rubia Gallega, a dual purpose breed very much used in the northwestern region of Galicia, and of a wide range of crosses among local and foreign breeds. The share of this group has been steadily decreasing in numbers as well as proportion of the herd.

Aside from breed substitution, better stock selection has also been achieved through greater use of artificial insemination. This has been particularly important for the Friesian population which experienced an increase in the percentage of cows artificially inseminated from 38.27 in 1973 to 73.8 in 1984. There are, however, marked differences among the different producing regions (Ministerio 1986c).

Another factor contributing to better stock selection is the government-sponsored herd-books programs for major breeds, breeding test activities, and milk recording schemes. However, the real scope of these measures is still relatively limited (Ministerio 1986c; Calcedo 1983).

Nutrition Developments

For the most part, Spain's agricultural regions are not well suited for grass and fodder production. With the exception of the humid coastal regions of the north, forage production is severely limited in the arid regions of the rest of the country. Irrigation is critical for the production of good forage crops in those regions.

The country's area under forage cultivation has increased only 3.5 percent from 1.17 million hectares in 1973 to 1.21 million hectares in 1985 (Table 6). However, forage production has expanded more than the area because production has shifted to irrigated areas offsetting the reduction of forage cultivation observed in non-irrigated land. Along with the enlargement in the area under forage, a process of substitution among different types of forage crops has also taken place. This includes increases in corn and alfalfa and reduction in roots and tubers and other less important forage crops. Yields have increased for legumes (alfalfa), feed pulses, some grasses, and non-irrigated grains, while remaining

stagnant for irrigated grains (Table 7). Changes have also taken place in the method of forage use. There has been an increase in the production of silage and dehydrated fodder and a reduction in grazing. The area under permanent pasture has also been reduced (Ministerio 1985).

Although Spain's forage production has increased substantially during the last two decades, production is still far from sufficient to satisfy the country's needs of these crops. This is particularly significant for the dairy sector which is left heavily dependent on concentrate feed for animal nutrition (de Blas et. al. 1987).

The use of manufactured feed by Spain's dairy sector has increased enormously as shown in Table 8. Production of concentrate dairy ration for lactating cows has quadrupled since 1973 reaching 1.1 million tonnes in 1983. Because the number of cows had remained fairly stable during that period, average concentrate consumption per cow has increased from 149kg in 1973 to 600kg in 1983. The figures in Table 7 relative to production and consumption of concentrate feed in the years 1981/1983 reflect the effect of a long and severe drought and should be considered above normal. On the other hand, these do not obscure the fact of the extreme dependency of the Spanish dairy sector on concentrate feed. Levels of concentrate use are substantially higher than those of other EEC's countries with much higher yielding herds (see Trostle et. al. 1986).

It would be difficult to deny that improved nutrition in the form of more concentrate feeding has enhanced milk productivity in the country. But it is also generally accepted that this intensive pattern of feeding, based heavily on concentrates, is unsatisfactory. It results in an unbalanced and costly ration which can produce metabolic disturbances in

Table 6. Harvested Area in Forage Crops in 1973 and 1985 (Thousands of Hectares)

<u>Forage Crops</u>	1973		1985	
	<u>Irrigated</u>	<u>Total</u>	<u>Irrigated</u>	<u>Total</u>
Grasses and Grains				
winter cereals	14.2	143.9	21.4	208.9
corn	33.4	91.1	31.8	106.7
sorghum	8.5	13.2	4.5	12.1
rye oats	13.2	69.5	16.7	58.2
other grasses	1.2	3.5	7.0	9.7
Legumes and Feed				
Pulses				
alfalfa	199.0	301.8	223.4	308.1
clover	8.7	56.9	6.4	15.4
"esparceta"	4.3	73.6	2.0	63.4
honey suckle	.07	7.5	.4	5.4
tares	8.9	115.8	13.5	99.3
beans	2.6	9.2	1.6	7.5
Roots and Tubers				
turnips	7.3	92.7	6.2	65.2
sugar beets	10.4	26.3	6.4	16.1
carrots	.5	.7	.2	.2
artichokes & others	.02	.3	.1	.4
Others				
meadows	17.1	128.8	36.2	213.6
cabbage	6.2	24.2	4.9	16.2
pumpkin	1.7	4.5	1.1	3.1
thistle and others	2.8	8.2	.5	1.3
Total	314.6	1,172.5	385.1	1,212.4

Source: Ministerio 1985 and other years

Table 7. Yields of Forage Crops in 1973 and 1985 (Thousands of kg per ha)

<u>Forage Crops</u>	1973		1985	
	<u>D.I.^a</u>	<u>IRR. L^b</u>	<u>D.I.^a</u>	<u>IRR. L^b</u>
Grasses and Grains				
winter cereals	12.9	19.5	12.7	19.5
corn	29.1	42.9	34.3	42.7
sorghum	10.9	37.4	14.2	40.3
rye oats	21.9	34.5	27.9	45.1
other grasses	17.8	29.7	10.2	27.2
Legumes and Feed				
Pulses				
alfalfa	20.6	47.9	18.2	53.1
clover	27.1	35.1	21.4	31.2
"esparceta"	11.7	25.2	10.6	28.3
honey suckle	17.1	19.7	8.9	25.0
tares	11.3	24.0	12.1	26.3
beans	11.5	23.9	9.5	19.8
Roots and Tubers				
turnips	19.1	30.3	17.1	23.6
sugar beets	24.1	40.9	27.7	38.2
carrots	11.0	26.1	10.8	24.4
artichokes & others	16.6	23.9	5.5	19.0
Others				
meadows	37.7	51.0	30.0	39.8
cabbage	22.5	34.3	22.0	32.8
pumpkin	10.5	16.7	11.4	20.8
thistle & others	15.5	21.5	9.5	19.6

Source: Ministerio 1985 and other years

Notes: ^a - Dry-land
^b - Irrigated land

Table 8. Estimated Consumption of Complete Concentrate Dairy Ration
Feed for Dairy Cows in Selected Years

<u>Year</u>	<u>Thousands of Tonnes</u>	<u>Thousands of Dairy Cows</u>	<u>kg/cow</u>
1973	289	1,935	149
1974	300	1,852	161
1975	342	1,811	191
1976	466	1,822	255
1977	507	1,950	260
1978	599	1,950	302
1979	753	1,810	416
1980	784	1,852	423
1981	1,043	1,853	562
1982	1,030	1,853	558
1983	1,140	1,881	606

Source: Ministerio 1985 and other years

the animals and low fat levels in the milk. The limited ability of Spain to produce forage crops has been one of the obstacles to the development of a more efficient and competitive dairy sector. Nevertheless, this inability to satisfy the country's requirement of forage does not stem exclusively from Spain's ecological situation but must be also attributed to technical, structural and managerial inexperience.

Herd Health

Animal health is an essential factor in profitable livestock production. Traditionally, dairy farming in Spain has been characterized by low levels of animal health. It has resulted in higher production costs, abortions, deaths, and slaughter of affected animals; inability to export live animals (with the consequent loss of foreign markets); and negative effects on public health because of the danger of human infection (Ministerio 1983).

In 1973, the Spanish government began a national program to eradicate

bovine tuberculosis. In the following year, measures were adopted to eradicate brucellosis. The outcome of these actions was however, very limited because inadequate funds were allocated to the program (Díaz Yubero 1985). Indemnity payments were substantially below the market price which logically contributed to a lack of response on the part of the dairy farmers to dispose of contaminated animals. The number of cows tested under the program ranged from 144,313 in 1974 to 99,284 in 1978, only 5 percent of the national dairy herd (Ministerio 1986c).

By the end of 1978 it was generally recognized by the animal health authorities that the promotion of a successful control and an eventual eradication of bovine tuberculosis and brucellosis needed greater participation by dairy producers. This would require indemnity payments for disposal of infected animals that were adequate and fair. With this consideration in mind, a second national program for the eradication of bovine tuberculosis and brucellosis was approved in 1978. The three main features of the program were: 1) parallel control of tuberculosis and brucellosis; 2) freedom to participate in the program; and 3) cooperation of the private sector and regional institutions in the funding of the program (Ministerio 1986c).

The number of cows under control, the incidence of the diseases, and funds allocated for indemnity payment under the program during the period 1978-86 are listed in Table 9. This table shows a widening of the scope of the program since 1978 in terms of funds allocated and number of animals under control. It can also be observed that the percentage of infected animals has been decreasing although the population under control has been growing. The table shows that tuberculosis is a more frequent

problem than brucellosis. By 1986, 1,684,454 dairy cows were being tested annually for infection of the diseases, 89.1 percent of the nation's dairy herd. As the result of these control activities, 72,306 cows were slaughtered because of tuberculosis symptoms and 30,219 due to infection with brucellosis (Ministerio 1986c). These figures indicate an incidence of the diseases of 4 percent for tuberculosis and 1.6 percent for brucellosis.

The program has been successful in almost completely eradicating both diseases in some of the principal dairy production areas, Asturias,

Table 9. National Eradication Program of Bovine Tuberculosis and Brucellosis

<u>Year</u>	<u>% of Cows controlled</u>	<u>% Positive for</u>		<u>Indemnity Payments</u> (millions of pesetas)
		<u>TB</u>	<u>BRUC</u>	
1978	7.2	3.1		62
1979	15	5.1		278
1980	25	6.1	3.6	652
1981	40.5	5.9	2.3	1,000
1982	57.5	5.5	2.4	1,845
1983	69.1	6.1	2.2	1,861
1984	72.2	4.2	2.5	2,313
1985	81.6	4.5	2.2	2,945
1986	89.1	4.0	1.6	3,138

Source: Ministerio 1986c and other years

Cantabria and the Basque country, where it has been possible to test the totality of the dairy herd. This achievement has additional importance in the drive against bovine brucellosis and tuberculosis since most of the replacement cattle sold elsewhere in the country are produced in these regions. On the other hand, there are still large production areas in the country (particularly Galicia) where the eradication efforts have been much less effective and where the incidence of both diseases is still above the

country's average (Ministerio 1987b; Junta de Audalucia 1987).

The drive against bovine tuberculosis and brucellosis is expected to accelerate in the future because the European Commission has endorsed the future eradication plan presented by Spain. This will enable Spain to obtain Community funds for eradication activities until 1989. In addition, the Commission has also endorsed a bovine leukosis eradication plan recently submitted by Spain which will set in motion activities to eliminate this disease (Commission 1988).

Another serious health problem in the Spanish dairy herd is the widespread incidence of mastitis. This infectious disease reduces milk yields, changes milk composition, shortens the productive life of the cow and results in higher costs of production. In a study of the economic losses from animal diseases carried out by the veterinary service of the Ministry of Agriculture in 1980, it was estimated that bovine mastitis increased production costs by 1.93 pesetas per liter or more than 9 percent of the milk price received by farmers (Diaz Yubero 1981). There are no estimates of the incidence of mastitis at the national level, but the information provided by several regional studies confirm the seriousness of the problem (Junta de Andalucia 1987). Mastitis has several probable causes: improper operation of milking equipment, inappropriate milking techniques and deficient sanitation of the cattle. Inadequate milking facilities, including insufficient supplies of water and lack of training of the dairy farmers to deal with the problem have also been noted as important factors contributing to the persistency of mastitis.

The above implies that the improvements in herd health has contributed to greater yield per dairy cow. Tuberculosis and brucellosis,

two of the diseases that have traditionally afflicted Spain's dairy sector, have been drastically reduced and their complete eradication appears to be near. The solution to the widespread incidence of mastitis is more uncertain. In fact, this is a problem that increases with high producing cows and with mechanized milking.

Farm Facilities and Equipment

Several labor-saving techniques and improvements in farm facilities and equipment have been and are being introduced to Spain's dairy farms. They have also contributed to increased milk production. However, the rate and intensity of adoption of more modern dairy facilities and technology varies substantially among regions and among farms within regions.

The most widely diffused labor-saving technique in dairy farming has been mechanical milking. The proportion of the nation's dairy herd mechanically milked doubled from 1974 to 1980 from 31 percent to 62 percent. Among regions, the use of milking machines ranged from practically one hundred percent in some producing areas of the east and northeast to a low 35 percent in the northwest regions of Galicia (Ministerio 1974; 1984). Despite the reduction in the number of dairy farms, the number of milking machines increased 50 percent between 1980 and 1985 (Ministerio 1985). Recent data for Galicia also shows a substantial increase in the use of milking machines in this more backward region with approximately 60 percent of the cows milked by machine in 1985 and nearly 100 percent in herds with more than 10 cows (Ministerio 1987b). A similar pattern by regions and farms is taking place with refrigeration tanks and forage storage facilities although the rate of adoption of these technical innovations is at a much lower level.

In 1982 a national plan for the modernization of dairy farms was launched which included grants up to 1/2 of the investment in addition to subsidized loans for investment in the acquisition of milking equipment, refrigeration tanks, forage harvesting machinery and for the construction of storage buildings, fences and other buildings (Ministerio 1983 b). This aid is expected to accelerate the adoption of more efficient equipment and improvement of the dairy farm facilities across the country. The aim of the program is to increase productivity of dairy farms. Participation however, is limited to those dairy farms with potential to achieve certain minimum standards for herd size, land base, etc. The decision to restrict the program to potentially viable dairy farms will exclude a large number of small farm units. This may accelerate the process of converting these farms or farmers to other activities.

Finally, it must also be noted that there are obstacles to modernization of dairy enterprises not related only to the dairy sector. Particularly important are inadequate electric facilities and water supplies which characterize many rural areas of the country. This limits the adoption of many available innovations. This problem is especially severe in the south (Ministerio 1984; Junta de Andalucia 1987).

Management Practices

Management practices in agriculture are highly influenced by the level of education of the farming population and by the service infrastructure provided by public and private organizations and institutions. Spanish dairying can be considered as the archetype of small family farming. More than 99 percent of the dairy farms are operated by single families with corporations, cooperatives, and other organizational enterprises accounting

for the remainder. In comparison with other agricultural activities, the number of hired laborers is very small - most of the tasks are performed by the farm operator and his family. Although young dairy farmers are better trained and have higher levels of schooling, the average age of the dairy farms' operators is still quite high. More than 20 percent of the farms are operated by individuals older than 55 years (Ministerio 1984). As a result, the average training of many dairy farmers is not sufficient to cope with the increasing complexities of dairy farming. This fact, together with a shortage of specialized technicians (privately or publicly provided) to provide adequate assistance, limits the potential to improve the management of dairy enterprises.

In sum, many important advances in the management practices of dairy enterprises have been made which have contributed to improvement in milk production. However, many management based problems such as inadequate sanitation and care of milking equipment, lack of financial and technical records, etc., pose major obstacles to improving dairy productivity.

CHANGE IN STRUCTURE OF DAIRY FARMS

Along with the technological developments outlined above, Spain's dairy sector has undergone a significant structural change whose more visible consequences have been a drastic reduction in the number of dairy farms and a rapid consolidation of herds. The number of dairy holdings decreased 48 percent from 573,184 in 1973 to 297,473 in 1982 (Ministerio 1974; Instituto 1984). Among production areas, reductions in the number of dairy farms ranged from more than 55 percent in the northwest region of Galicia to less than 30 percent in some areas of the south, east and northeast. The average number of cows per holding has increased from 3.4

in 1973 to 6.8 in 1982. This increase in animals per holding has taken place mainly on farms with at least 10 cows and is considered to be the lowest limit of a viable size. Among regions, the average number of cows per farm ranged from 5.9 in the north to 12.6 in the northeast (Instituto 1984).

The latest available complete information on Spain's dairy farm structure at the national level comes from the Agricultural Census of 1982³. But according to information provided by recent regional studies, annual rates of reduction in the number of dairy farms in some production areas are at 4.5 percent (Ministerio 1987b). It is roughly estimated that the number of dairy farms in Spain in the year 1986 ranged between 230,000 and 250,000. These figures give an average size herd from 8 to 12 cows. Therefore, in spite of the technical and structural changes which have occurred in Spain in the last 20 years, there still exists a large number of dairy farmers operating very small units with few production alternatives. An additional problem related to the structure of the dairy farm sector is the insufficient land base for a large proportion of the country's dairy farms. The 1982 Agricultural Census reported that more than 46 percent of the nation's dairy farms had less than 5 hectares (Instituto 1984). There are also a substantial number of farms with a larger size, but with very low land potential. This situation exists for many dairy farms located in the dry lands of the interior east and south of the country.

³ A national survey of dairy farms has been taken during 1987 but the results have not been made available yet.

SPAIN'S ENTRY IN THE EEC

Conventional and Special Transition

Spain's entry into the EEC took effect on January 1 of 1986. As with previous enlargements of the Community, it allows for a transitional period for the full operation in the country of the mechanisms of the EEC's agricultural policies. The transitional arrangement of the countries who have joined the Community in the past show certain common features. These have come to be known as "conventional transition," (Commission 1986a). However, the special characteristics of Spain's agriculture and its unique problems required a special type of transition period which contains some arrangements similar to those of the "conventional transition" but which also includes new mechanisms (Accession Treaty chapter 3).

The main features of the "conventional transition" include: 1) alignment of institutional prices applied in Spain with those of the Community; 2) alignment of assistance to agriculture; 3) harmonization of customs protection schemes, and 4) harmonization of general legislation and institutions (Commission 1986a). The new arrangements in the Spanish transition involve first the establishment of a two stage transition period for the full introduction of the EEC market mechanisms for fruits and vegetables (Accession Treaty, article 131). Second, a supplementary mechanism is established to monitor trade of sensitive products between the "old" Community and Spain. This mechanism is referred to as the Supplementary Trade Mechanism (STM) (Accession Treaty, articles 81 to 85).

In this section, the conventional and specific transition arrangements concerning Spain's dairy sector are reviewed. But first, as a background, to the discussion, a brief sketch of the principle instruments of the EEC's dairy policy are presented.

Sketch of EEC's Dairy Policy

Dairy policy mechanisms of the EEC include price support measures, surplus disposal assistance, export subsidies, import levies and measures to control supply.

Price Support Measures -- Butter and skimmed milk powder (SMP) (also certain cheeses for Italy) have been regularly purchased by the intervention agencies at fixed intervention prices. But since March 1987, a curb on buying of butter and skimmed milk powder has been introduced, as well as the possibility of their suspension under specific circumstances (Commission 1987b)⁴.

Surplus Disposal Aids and Subsidies -- A variety of assistance and subsidies are provided to promote internal use of dairy products in schools and non-profit institutions and for use in animal feed and industrial products. Export subsidies are provided to exporters to offset the difference between EEC and world prices.

Border Protection Schemes -- Threshold prices are established for milk and other dairy products. These are maintained by variable levies which are the differences between the threshold and the minimal offer prices for imports.

Supply Control Measures -- Dairy farmers support some of the costs of the EEC dairy programs through a "co-responsibility levy" which is collected by the dairies on the farmers' milk delivered to industry. It is fixed at a percentage of the target price. The "co-responsibility levy"

⁴ Purchases of skimmed milk are restricted to the period from March 1 to August 31, and can be suspended if quantities offered during this period exceed 100,000 tonnes. Beginning March, 1987, purchases of butter may also be suspended if quantities offered surpass 180,000 tonnes.

funds are used to promote sales. Exceptions to the payment of the levy are provided.

Finally, a system of quotas (reference quantities) on milk deliveries has been operating since 1984 to curtail milk production (Commission 1984). The quotas are enforced by a super-levy of 100 percent of the target price of milk for over-quota deliveries (Commission 1987b).

Alignment of Prices and Assistance

The period established for an alignment of institutional prices and assistance between Spain and the EEC is seven years, beginning in March 1986. At that time institutional prices for dairy products in Spain were higher than in the Community. The Act of Accession established that this price gap would have to be reduced by 50 percent during the first 4 years and would be completely eliminated by the seventh year (1992) (see articles 68 to 73). Table 10 shows the institutional prices of butter and SMP in Spain and in the EEC during the marketing years 1985-86 and 1986-87. For both products, Spanish prices were higher, with the difference being greatest for SMP. If, as can be expected, the Community continues with a restricted price policy for dairy products, freezing or allowing only minor variations, Spain's prices will have to decline in nominal terms.

As noted above, EEC's dairy policy provides a variety of programs and subsidies, neither of which were applied in Spain before 1986. These support mechanisms began partially operating in Spain upon its entry into the EEC (Accession Treaty articles 79 and 80). The amount of funds that Spain receives from the EEC for support of the dairy sector are being

Table 10. Intervention Prices for Butter and Skimmed-milk Powder (SMP)
in Spain and in the EEC (ECU/Tn)

		<u>Spain</u>	<u>EEC-10</u>	<u>Price Spain/ Price EEC-10 percent</u>
Butter	Marketing year 1985-86	3,525.4	3,132.0	112.56
	Marketing year 1986-87	3,4807.2	3,132.0	111.13
S.M.P.	Marketing year 1985-86	2,438.0	1,704.4	143.04
	Marketing year 1986-87	2.378.8	1,704.4	139.56

Source: Ministerio 1986a

increased annually. The allocation is increased by one-seventh of the total allocation for each year beginning in 1986 until 1992 when the full allocation will be received. The Community's policy on agricultural structure for all other commodities has also been operating in Spain since 1986 in the same manner as the specific dairy programs.⁵

Harmonization of Custom Protection Schemes

To compensate for the price gap between Spain and the EEC until 1992, (for example, to preclude French producers from delivering its products to the Spanish interventional agencies at the higher prices) taxes are charged on exports from other EEC countries to Spain. These "accession compensatory amounts" are equal to the differences between Spain's and EEC's institutional prices. Spain's dairy sector is also protected from

⁵ The current structural policy of the EEC includes measures directed to the modernization of farms, cessation of farming and vocational training, processing and marketing of agricultural products, producers groups, less-favored areas and specific regional measures (Commission 1988).

EEC's imports through a set of quantitative restrictions under the supplementary trade mechanism (STM) (see article 84). This feature will apply throughout the transition period. The STM for dairy products consists of two stages. During the first stage which lasts until 1989, "guided quantities" are fixed for imports of Spain from member countries. These quantities must increase steadily during the period. The "guided quantities" for dairy products to be imported to Spain from the EEC-10 until 1989 are shown on Table 11⁶. Beginning in 1990, these "guided quantities" will be replaced by "maximum indicative import ceilings" of imports. These will be established annually at the beginning of the marketing year, according to the observed market conditions. If imports surpass the limit, measures are to be taken either to raise the limit if the local market disruptions are minimal, or to stop imports during the time needed to offset the initial market disruption.

Table 11. Quantities of Dairy Products to be Imported by Spain
from the EEC 1980-1989 (thousands of tonnes)

	1986	1987	1988	1989
Milk and Cream	200	220	247	284
- fresh milk	160	176	198	227
- milk and cream in small containers	40	44	49.5	56.9
Butter	1	1.1	1.3	1.5
Cheese	14	16.1	18.5	21.1

Source: Ministerio de Agricultura, Pesca y Alimentacion.

Import of dairy products from non-EEC countries have been subject, since March 1986, to the border protection measures established under the

⁶ Milk powder for human consumption has been subject since entry to the "maximum indicative import ceilings" (see below). Milk powder for animal feed was liberalized previous to entry.

Common Agricultural Policy (CAP). The variable levies applied under the CAP are adjusted by the "accession compensatory amounts" applicable to Spain's trade with the Community to take into account the price difference between Spain and the EEC-10. Moreover, quantity restrictions are also imposed on products subject to the STM imported through EEC countries, (articles 143 to 146).

Harmonization of General Legislation

The government's pre-EEC role in the market organization for dairy products in Spain was contrary to the requirements of the Common Agricultural Policy. This was particularly evident for internal commercial trade where processors enjoyed exclusiveness rights for milk collection and for the sale of pasteurized milk (Decreto 2478/66). These rights were incompatible with Community law and therefore the Act of Accession required their abolition by January 1, 1987. Important progress has been made in the harmonization on Spain's legislation with that of other EEC countries in technical areas such as veterinary and animal husbandry, veterinary inspection, and animal feed stuffs. Spain's participation in the current Community programs for agricultural research will also have an impact on the dairy sector (Commission 1988).

Co-responsibility Levy

Like other Community's dairy producers, Spain's dairy farmers, since entry into the EEC, have contributed financial support to the Community's dairy program. These payments, as noted above, are known as the "co-responsibility levy." There are exceptions to this levy to accommodate the difficulties of small dairy farmers and of certain Community regions (Commission 1981) which apply in Spain. Of particular importance is the

total exemption to payment of the levy granted to areas with exceptionally low average yields. This applies to the whole region of Galicia where more than 30 percent of milk production in Spain takes place (Ministerio 1986a).

Milk Quota System

The Community's milk quota system was applied to Spain immediately upon entry into the Community. An initial guaranteed overall quantity of 5,400,000 tonnes of milk was fixed for Spain. This was based on annual 1983 producer milk deliveries. Of this quantity, 4,650,000 tonnes was allocated for deliveries to marketing firms and 750,000 tonnes was allocated for direct sales to consumers (Ministerio 1986a).

In April 1986, the Community Council adopted the proposal to reduce milk output by 3 percent within three years. In its December 1986 meeting, the Council modified its April decision regarding the reduction of the milk production. It adopted a more drastic decision to reduce milk output by 9.5 percent over two years by quota reductions -- 6 percent from April 1, 1987; 2.5 percent from April 1, 1988, and a further 1 percent reduction expected to take place by tightening the application of the quota system (Commission 1986a).

To achieve these objectives, the Community has introduced two mechanisms to induce dairy farmers to reduce or cease milk production: voluntary cessation of milk production and temporary suspensions of milk quota. The first of these arrangements provides for an incentive payment equal to 6 ECU's/100kg per year for seven years to dairy farmers willing to discontinue all milk production permanently. It is equivalent to buying their milk quota. Under the second arrangement, dairy producers

receive 10 ECU's/100kg per year for temporarily discontinuing production. The permanent cessation program targeted to reduce milk output by 3 percent and the temporary suspension program is targeted to reduce milk output by 5.5 percent (Commission 1987b).

In addition to the arrangement outlined above, a super-levy on excess production was raised from 75 percent to a 100 percent of the target price for quota milk. This provision is expected to reduce production by 1 percent, therefore achieving the 9.5 percent reduction originally planned.

In the December meeting of the Community Council, special arrangements were made for Spain in recognition of special problems of its dairy sector and of the recent introduction of the quota system. As a result, Spain has been left some flexibility to implement the decision of the Council. In this sense, Spain was allowed to reduce the general 8.5 percent reduction in the quota to 3.0 percent of the quota, essentially the compromise achieved in April 1986 to reduce the quota by 3 percent. These arrangements are to be financed with compensation of the kind described above. The response of Spain's dairy farmers to the compensation scheme for permanent discontinuation of milk production has been very high. By February 1987, three months after application for cessation of dairying began to be accepted, 4,550 applications had already been presented, which corresponded to 55,000 cows with an estimated production of 208 thousand tonnes, equivalent to 4 percent of the assigned national quota (Actualidad Agraria). It is expected that the scheme is providing a good opportunity for exit for those dairy farms with viability problems or for advanced age operators, since priority is given to applications with these characteristics.

The future directions of the quota system were stated in a report presented by the Commission of the Community in September of 1987 (Commission 1987a). In that report the Commission proposed to extend the existing quota system from April 12, 1989 to September 30, 1989. In addition, the report proposed a transition period beginning in October 1, 1989 and ending on October, 1991 when an equilibrium in the EEC's dairy market is expected to be attained. During this transition period the suspended quotas will be transferred into permanent quota reductions. From then on, the system of quotas will be maintained but with a larger degree of flexibility to allow for greater specialization in the sector.

SUMMARY AND CONCLUSIONS

Spain increased its milk production by 62 percent from 1966 to 1986 with only a 13 percent increase in herd size. This was possible because of a large increase in production per cow which resulted from substitution of specialized milk cow breeds for the traditional dual purpose cows, improved quality of forage, animal nutrition, animal health, and a variety of improved management techniques. Yet Spain's industry still lags behind the dairy industry of most other EEC member countries, an organization which it joined in 1986. This situation is important because Spain's industry is now faced with more direct competition from other dairy producers in the community. This paper examines some of the factors which have an are inhibiting Spain's ability to become more efficient and competitive. They are:

1. The existence of many small and inefficient dairy farms which has been accentuated in the traditionally most naturally favored areas for dairy production. The average number of animals per holding in 1986

was substantially below that of the Community's. These figures are even more unfavorable in the northern regions where the bulk of the country's milk output is produced.

2. The low and irregular output of natural forage in most of the country and the limited output for forage crops which results in costly and inadequate rations.
3. The low level of technical and managerial capacity of the sector in terms of breeds, stock selection practices, nutrition and health management, and farm equipment and facilities.

The continuation of these obstacles has been maintained by the low priority given by Spain to agricultural research during the sixties and seventies. The model for technological change in the country's agricultural sector was one in which imported technology played a major role in the achievement of productivity and growth. This was particularly true in the livestock subsector which was forced to rely substantially on foreign technologies which are easy to transfer such as improved breeds, concentrate feeds, chemicals, machinery, etc., (Soria and Rodriguez-Zuñiga 1983). This path of technological change was quite successful in the pork and poultry industries because of the low environmental sensitivity of the production technologies used in these two sectors. The dairy sector, however, is much more dependent on location-specific factors. It consequently suffered heavily from the lack of domestic research, in particular, for forage production. The limited scientific and technical knowledge on forage crops and their management in animal nutrition has reduced the competitiveness of dairy enterprises across the country.

In the future, the Community's dairy policy will provide a new

framework for the development of Spain's dairy sector. Spain's institutional prices for dairy products are expected to hold at current levels at best, or even decrease nominally. Secondly, the limits set to individual reference quantities (quotas) reduce the possibility to increase production by innovative farmers. Only small expansion may be possible which is dependent on the process of voluntary cessation of dairying by other farmers. The seven year transition period to full application in Spain of the Community's marketing policies for dairy products provides some opportunity to modernize the country's dairy farm sector. Failure to do so may result in exit of resources from the sector and in the inability of the country to satisfy its own demand requirements for dairy products.

As described above, some of the problems which have traditionally affected Spain's dairy sector such as the widespread incidence of tuberculosis and brucellosis among cattle, seem to be near to solution. The problem of inadequate milk collection and handling has already been solved in some production areas and rapid advances are being made in other parts of the country (Minsterio 1987b). Advances in stock selection activities (e.g. herd replacement, etc.) can be made in a short time. It is feed, nutrition, and management problems that pose major challenges in the near future.

Feed production and improved animal nutrition face serious constraints. Forage production for dairy rations is constrained in Spain by the limited land base area on most of the dairy farms and, especially for those located in the areas best suited for forage production. The general tendency of farmers in the highly productive irrigated areas of the center and south of the country to specialize either in crop or in

livestock enterprises instead of in a combination of the two also acts as a constraint on feed production for dairy cattle. Recent studies have indicated a significant potential for the development of land based dairy enterprises in the irrigated areas of the south. Research efforts are also underway on the possibility of increasing the use of agricultural and industrial by-products for the feeding of the dairy herd (Perez Lanzac 1987). Efforts are also being made to train dairy specialists to assist farmers in their management problems. Funds are also being channeled to improvement of rural infrastructure.

Success in modernizing the dairy industry will also depend upon the degree of mobility of resources by channeling the quotas from farmers no longer interested in dairying to new and efficient farms or to farms with the possibility of becoming viable in the near future. The initial massive response of Spain's dairy farmers to the cessation programs of the Community Dairy Policy allows some degree of optimism in that respect.

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