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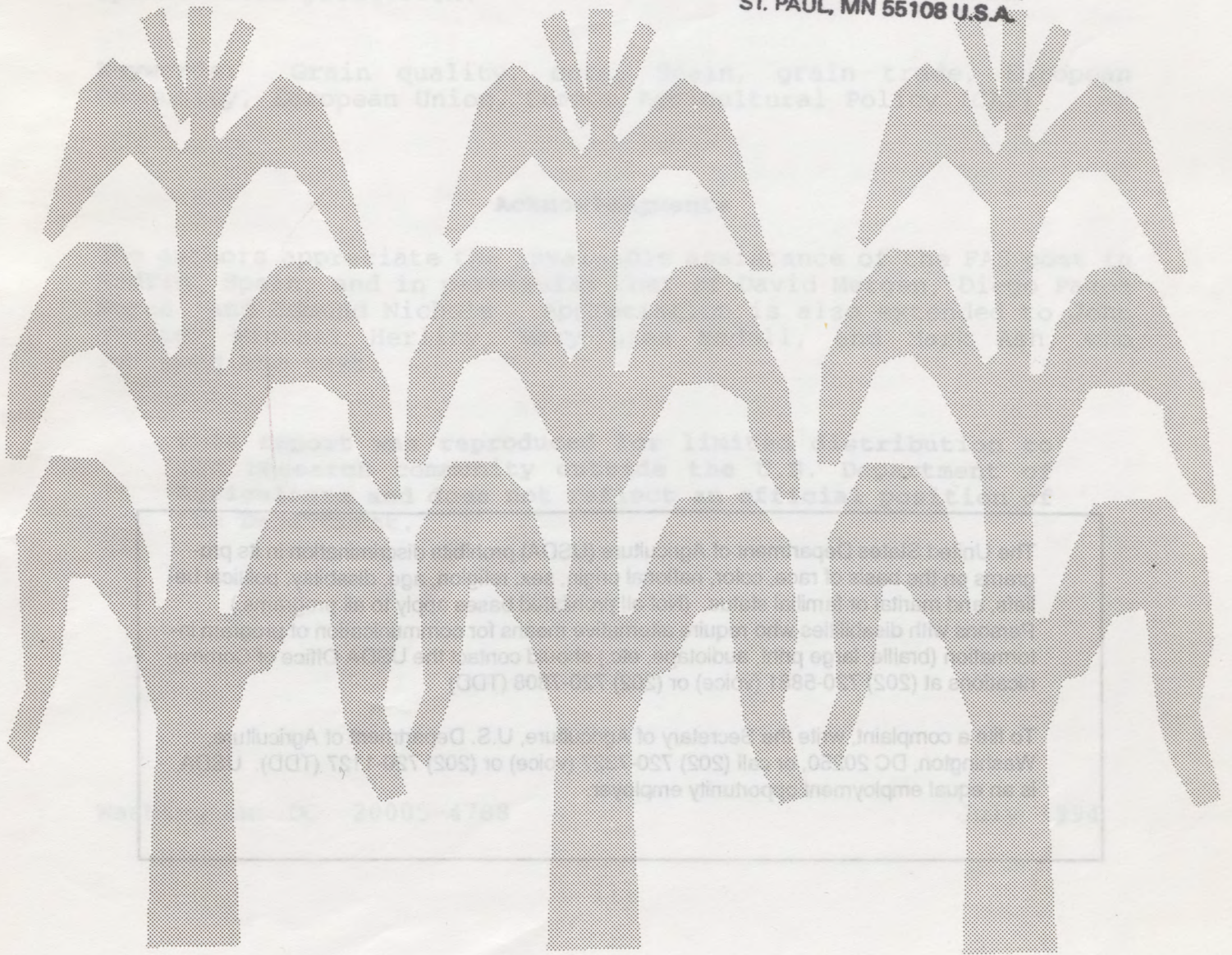
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Spain

Determinants of Corn Import Demand

Mildred M. Haley
Mary Anne Normile

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Spain: Determinants of Corn Import Demand. By Mildred M. Haley and Mary Anne Normile. Agriculture and Trade Analysis Division, Economic Research Service, U.S. Department of Agriculture. Staff Report No. AGES-9410.

Abstract

The main determinants of Spanish demand for imported corn are Spain's adherence to the EC's Common Agricultural Policy (CAP) and the U.S.-EC Enlargement Agreement. Spain's adoption of the CAP raised corn prices, leading livestock producers to substitute less expensive feed ingredients, and increased protection from imports. Spain's entry into the EC resulted in slightly higher domestic corn production, lower imports, and lower consumption. The Enlargement Agreement requires Spain to import 2.3 million tons per year of corn and other feed ingredients. Quality considerations are secondary to agricultural policy in determining the quantity and source of Spain's corn imports. The new CAP for grains will reduce Spanish corn production.

Keywords: Grain quality, corn, Spain, grain trade, European Community, European Union, Common Agricultural Policy (CAP)

Acknowledgments

The authors appreciate the invaluable assistance of the FAS post in Madrid, Spain, and in particular that of David Mergen, Diego Pazos Moran, and Edmund Nichols. Appreciation is also extended to John Jacobs, Michael Herlihy, Mary Lisa Madell, and Mark Ash, who reviewed the text.

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Preface

This report is one of eight reports on the major corn-importing countries prepared by the Economic Research Service (ERS) in support of a comprehensive study of cleaning U.S. grain destined for export. Similar reports have been released for wheat and others are forthcoming for soybeans.

The Food, Agriculture, Conservation, and Trade Act of 1990 (FACTA) required the Federal Grain Inspection Service (FGIS) to establish or amend grain grades and standards to include, "...economically and commercially practical levels of cleanliness." The legislation required FGIS to determine if the benefits of cleaning exceeded the costs. FGIS subsequently asked ERS to conduct the study. The comprehensive study on corn included two major components: (1) economic-engineering studies of the cost of corn cleaning in the United States and estimates of domestic benefits from cleaning and (2) a series of in-country interviews of buyers in major corn-importing countries to determine the effects of cleaner U.S. corn on sales in these markets.

The results of this work have been prepared in a three-volume set:

"Economic Implications of Cleaning Corn in the United States," AER-686, by Chin-Zen Lin and William Lin.

"The Role of Quality in Corn Import Decisionmaking," AER-684, by Stephanie A. Mercier.

"The Costs and Benefits of Cleaning U.S. Corn: Overview and Implications," AER-688, by William Lin, Chin-Zen Lin, and Mack Leath.

The eight country case studies form the foundation for the results of the international component of the corn-cleaning study. The eight countries studied accounted for roughly 60 percent of world corn imports and just over 70 percent of U.S. corn sales in 1992. Each report has two components: background on the corn-marketing policies, institutions, and distribution system in the corn-importing country and results of interviews of corn traders, processors, and government officials. All the interviews were completed during April-December 1992, and all followed a similar format. Each interview team consisted of both a commodity specialist and a country specialist. They attended a series of seminars on grain quality issues, data collection, and interview procedures before doing their interviews.

All the interviews followed a specific set of guidelines. An advisory panel of government officials, private traders and trade

association members helped develop the questions, which consisted of five topic areas:

- The most important factors in the choice of a supplier country;
- Quality factors most important to the importer's purchase decisions and the importer's perception of corn purchased from their suppliers;
- Contract specifications the importer uses to communicate preferences;
- The level of broken corn and foreign material in the shipments the importer receives and the costs of removing it; and
- If U.S. corn were cleaner, would the importer purchase more and/or be willing to pay more?

The background information on the corn-importing country and the responses from the interviews provide a unique insight into the role of quality factors in the corn purchase decisions of the major importers of U.S. corn.

Alan J. Webb
Coordinator, Country Case Studies

Reports in the Series, "Determinants of Corn Import Demand"

Country study

Authors

Egypt	John Parker and Shahla Shapouri
Japan	Lois Caplan and Alan Webb
Mexico	Constanza Valdes and Mark Ash
Russia	Sharon Sheffield and Roger Hoskins
South Korea	Terri Raney and Nancy Morgan
Spain	Mildred Haley and Mary Anne Normile
Taiwan	Sophia Huang and William Lin
Venezuela	Parveen Setia and Erin Dusch

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Note: All tons referred to in this report are metric tons (1 metric ton = 1.102311 short tons). In 1992, the year in which the interviews were conducted, the exchange rate was \$US 1 = 104.01 Spanish pesetas.

Summary

Spain is both a producer and importer of corn. The Spanish corn market was characterized by producer price support and relatively liberal import access during the early 1980's. Upon its entry into the European Community (EC), Spain adopted the Common Agricultural Policy (CAP), which raised producer prices for corn slightly, but raised protection on non-EC imports significantly. As a result, Spain now imports more corn from other EC countries and less from non-EC countries.

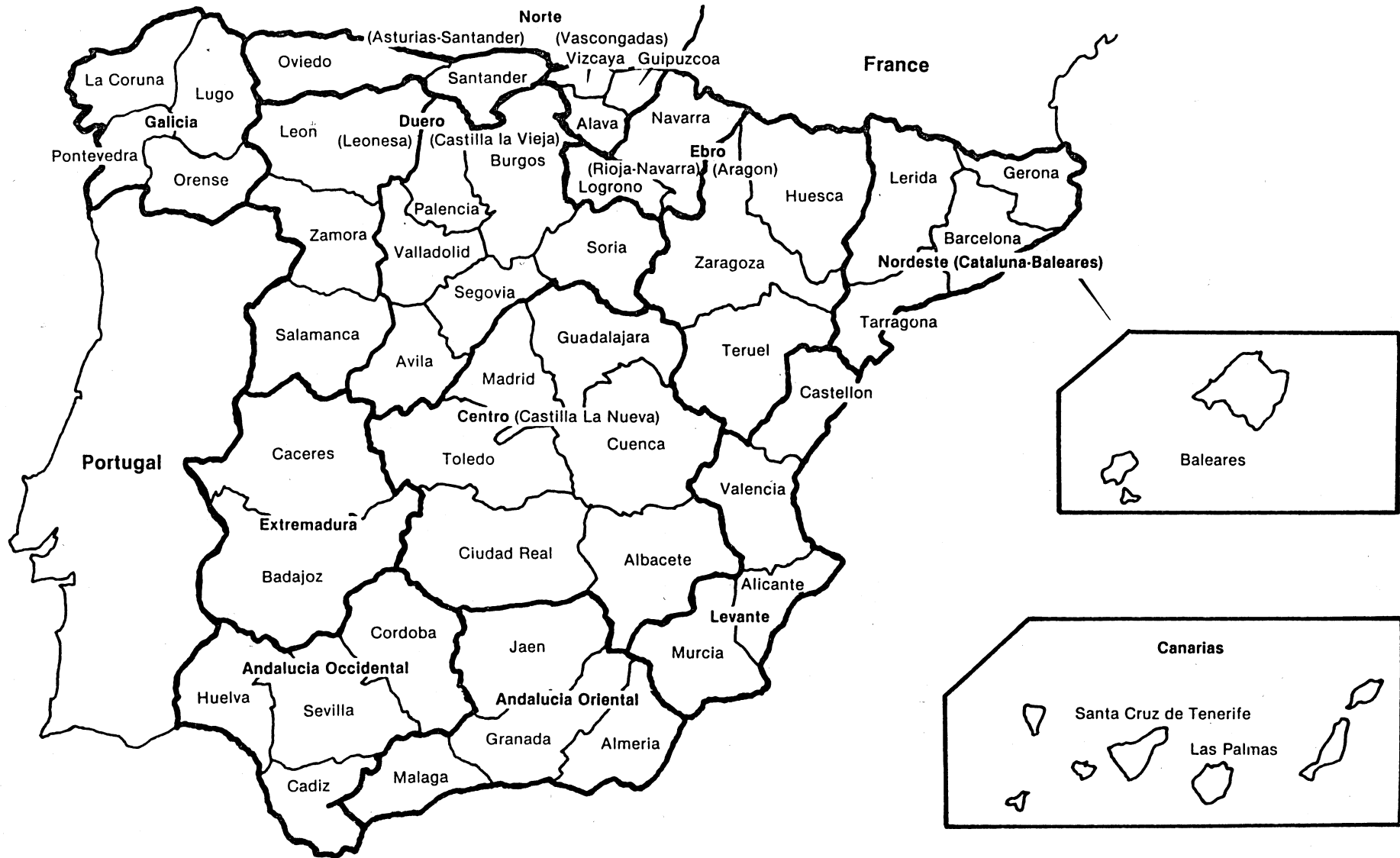
Corn is primarily used as a livestock feed in Spain, mainly by the large pork and poultry industries. Other major users include the wet- and dry-milling industries. Imports and use of non-grain feed ingredients have risen significantly since accession. Adoption of CAP prices and import policies has made corn more expensive relative to other feed ingredients and has reduced demand for corn as a feed. As a result of Spain's entry into the EC, domestic corn production has increased while both imports and consumption have declined.

The U.S.-EC Enlargement Agreement provides compensation to the United States for grain exports lost when Spain became a member of the EC. It requires Spain to import 2.3 million tons per year of corn and other feed ingredients. The mechanics of the agreement favor imports of corn from the United States.

Interviews of upper-level managers of seven agribusiness firms in Spain were conducted in June 1992. The interviews included questions regarding the firm's use of corn, sourcing criteria, quality preferences, and concerns regarding broken kernels and foreign material in corn shipments. The survey found that the most important factor influencing the decision to import corn was the U.S.-EC Enlargement Agreement. Where quality characteristics are an important sourcing criterion, respondents considered Argentine corn to be of superior quality. Spanish sourcing decisions are more strongly influenced by buying practices under the Enlargement Agreement and crop-year dynamics than by quality considerations.

If not for the requirement to import corn under the Enlargement Agreement, it is unlikely that Spain would import corn from non-EC countries in any significant quantity. The variable levy imposed on imports of corn from countries outside the EC makes it prohibitively expensive for all but specialty uses.

Map of Spain



Spain

Determinants of Corn Import Demand

Mildred M. Haley
Mary Anne Normile

Introduction

Corn plays an important role in the agricultural economy of Spain. Spain is an important producer and consumer of corn, both in its own right and as a member-nation of the European Community (EC). Spain produces 13 percent of the EC's corn, and accounts for 40 percent of its corn imports. And although Spanish agriculture operates within the framework of the Common Agricultural Policy (CAP) of the EC, the structure of the 1987 Enlargement Agreement between Spain and the United States allows corn imported from non-EC countries to continue to provide an important source of energy and protein to Spanish livestock and poultry. This study examines factors affecting Spanish demand for imported corn, and in particular the role of quality in import sourcing decisions. Spanish supply and utilization of corn, together with Spanish corn-users' assessment of U.S. corn quality characteristics, are examined below.

General Economic Profile

Spain, with a population of 39 million, is the EC's fifth most populous country. Spain's economy, until the recent recession, was characterized by a high rate of growth despite persistent high unemployment and high inflation. Spain ranks second in the European Community in annual growth of GDP, behind Luxembourg (table 1). Spain ranks ninth among the 12 EC countries with per-capita income (GDP) at \$9,782 in 1989. The EC average in that year was \$14,914. Despite the high rate of economic growth, Spain has the EC's highest rate of unemployment (22 percent in 1990 vs. 11 percent for the EC), and one of the EC's highest inflation rates. Between 1985 and 1990, consumer prices rose by an average 6 percent yearly, compared with 4.3 percent overall in the EC and 3.2 percent in the United States. Among the EC member countries, only Greece and Portugal have higher inflation.

Table 1--Spain: Basic economic statistics

Item	Value
Population, 1990	38.925 million
Per-capita GDP, 1989	\$9,782/person
Annual average growth of GDP, 1984-89	4.2%
Unemployment rate, 1990	21.8%
Annual average inflation rate, 1985-90	6.2%

Source: EC Commission, Eurostat.

Spain joined the EC in 1986.¹ The EC is an economic customs union, a trading arrangement characterized by tariff-free trade in goods among all participating countries and a common external tariff or other trade policy with respect to non-member countries. With the Single Market provisions enacted in 1992 that allow virtually free movement of goods, services, and factors of production, the EC has moved closer to a true common market.

Spain's entry into the EC provided a strong boost to its economy. EC membership stimulated business investment both by foreign companies and by domestic firms forced to modernize in the face of increasingly intense foreign competition. Spanish imports from other EC countries increased following accession as a result of the dismantling of protection between Spain and EC members (OECD, 1988).

Profile of Agriculture

Spain is a large agricultural producer, despite the fact that much of its land is not well suited to agriculture, being either semi-arid or mountainous. Spanish agriculture suffers from many of the same structural problems as the rest of the EC--small average farm size and an agricultural population that is aging and declining in numbers. The share of Spain's population employed in the primary sector (agriculture, forestry, hunting and fishing) has declined from 30 percent in 1970 to 9 percent in 1992. However, compared with most other EC countries, more of Spain's population depends on agriculture for a living (13 percent vs. 7 percent for the Community as a whole). In the EC, only Ireland, Portugal, and Greece have a higher share of the population dependent on agriculture for their livelihood.

¹The EC has 12 member nations--Belgium, Luxembourg, Netherlands, France, Germany, Italy (the original six), the United Kingdom (UK), Denmark, Ireland, Spain, and Portugal.

Most of Spain's agricultural land is planted to grains, industrial crops (including oilseeds and fibers), olive groves, and vineyards. In recent years, there has been a decrease in the number of farms and an increase in average farm size both in Spain and in the EC as a whole. Spain's farms tend to be smaller than the EC average.

Spain ranks fourth in the EC in value of agricultural production, behind France, Italy, and Germany. Fruits and vegetables, cereals, and hogs are the most important products by value of production (table 2). Barley is the most important cereal produced, followed by wheat and corn. Spain produces about half of all the citrus fruit produced in the EC.

Spain has a large livestock sector. Its hogs, goat, sheep, beef cattle, and poultry sectors are among the largest in the EC. Only in dairy production does Spain rank below third (sixth) in the Community.

Corn is primarily used as a livestock feed in Spain's large pork and poultry industry, and competes with other grains and nongrain feeds. Corn is also used in the wet- and dry-milling industries. Spain has the EC's largest wet-milling industry. Use of corn for human consumption is very small. Corn use by these sectors is discussed in detail in "Corn Supply and Utilization."

Government Policies Related to Corn Production and Use

Government policy played an important role in influencing Spain's corn imports both prior to and following Spain's accession to the EC. In the years before accession, Spain's agricultural policy was oriented toward preparing Spain for EC membership by adopting policy instruments that resembled those of the EC's Common Agricultural Policy (CAP). Upon joining the EC, Spain came under the CAP, with agricultural policy formulated at the EC level.

Spanish policy in the pre-accession period was oriented toward increasing domestic production and reducing dependence on foreign supplies. To achieve these objectives, the Spanish government used support prices, premiums, incentives, and other instruments to encourage domestic production of commodities where imports were large (Peterson et al., 1983). An intervention system similar to the EC's helped to support producer prices above the world market price, but featured ceiling as well as floor prices. When the average market price fell to or below the lower intervention price, a government agency could purchase corn and store it. The government could also authorize storage payments and grant export credits to bolster prices. If the average market price exceeded the upper intervention price, the government could release stocks, lower import barriers, or otherwise increase supply (Kelch, 1982).

Table 2--Share of main products in the value of agricultural production, 1991

Activity	Spain	EC
	Percent	
Grains	9.6	12.1
Fruit, vegetables	31.5	19.0
Olive oil	5.5	2.4
Milk	7.2	15.8
Beef and veal	6.1	11.2
Pigmeat	10.9	10.4
Eggs, poultry	7.3	7.1
Other ¹	21.9	22.0
Total	100.0	100.0

¹Includes oilseeds, wine, textile fibers, tobacco, sheep and goat meat.

Source: EC Commission, *The Agricultural Situation in the Community, 1992 Report*.

Domestically produced corn received some protection from foreign competition through an "entry price," which operated in a manner similar to the CAP's threshold price. In contrast to the EC's system, Spain's entry price was lower than the internal support price. The import regime allowed Spanish corn to compete with imports to satisfy domestic demand without creating structural surpluses or deficits (Kelch, 1982). As a result, Spain's corn imports grew, and in the years immediately prior to joining the EC, ranged from 2-4 million tons per year, depending on the size of the Spanish grain crop.

Upon joining the EC at the beginning of 1986, Spain began a 7- to 10-year transition to full adoption of the CAP. EC grains policy at the time of Spain's accession was characterized by high support prices, protection from imports, and subsidized exports. Support prices for cereals, including corn, were guaranteed through market intervention, that is, a national government agency purchases commodities at the established support price and stores them for later sale or export. Import protection prevents lower-priced products from entering the EC market and undercutting the support price. A variable levy equal to the difference between the lowest import price and the threshold price, or minimum import price, is assessed on imports. The variable levy changes frequently because import offer prices fluctuate with changing world market conditions. Exports of most price-supported commodities are

assisted by means of export subsidies based on the difference between the internal EC market price and the world market price. These subsidies, called "restitutions" or "refunds," allow EC exporters to sell these commodities on the world market.

Since the early 1980's, the EC has been faced with the problems of burdensome grain surpluses and excessive budget outlays for agricultural programs. The EC tried a number of measures to reduce grain surpluses and shift some of the cost of surplus disposal to producers. Among these were freezing or reducing support prices, assessing producer levies on marketed grains, setting production ceilings with penalties for overproduction, restricting the availability of intervention, and establishing a set-aside program for crops.

These measures reduced the profitability of grain production in the EC, but their effect on production varied by grain type and by region. In Spain, where most of the corn is produced on irrigated land, there was a significant drop in area after 1988 as farmers switched to crops that could be grown more profitably on irrigated land.

In marketing year 1993/94, a revised support program was implemented for many commodities. The program of CAP reform for grains, oilseeds, and protein crops has shifted the means of providing support to arable crops producers from price support to producer payments, or a combination of lower support prices and producer payments. The new program did not directly alter import protection or export subsidy mechanisms, although the levels of variable levies and export refunds change in line with reductions in support prices.

Under CAP reform, there is a single intervention price for all grains. Grain support prices will be reduced by 33 percent between 1993/94 and 1995/96. As compensation for lost income, producers will receive payments based on the area planted to grains. Payments will vary by region to reflect regional yield differences. To be eligible for payments, producers must set aside a fixed percentage of their base area; this percentage is 15 percent in the first year. Small producers are not required to set aside land.

The CAP's high price supports have encouraged expansion of grain production in Spain. Other programs that assist grain producers include the Spanish government's subsidies for purchases of diesel fuel, certified seeds, crop insurance, and investments in irrigation, all of which make grain production more attractive by reducing input costs, raising yields, or reducing risk.

Effect of the CAP on Corn in Spain

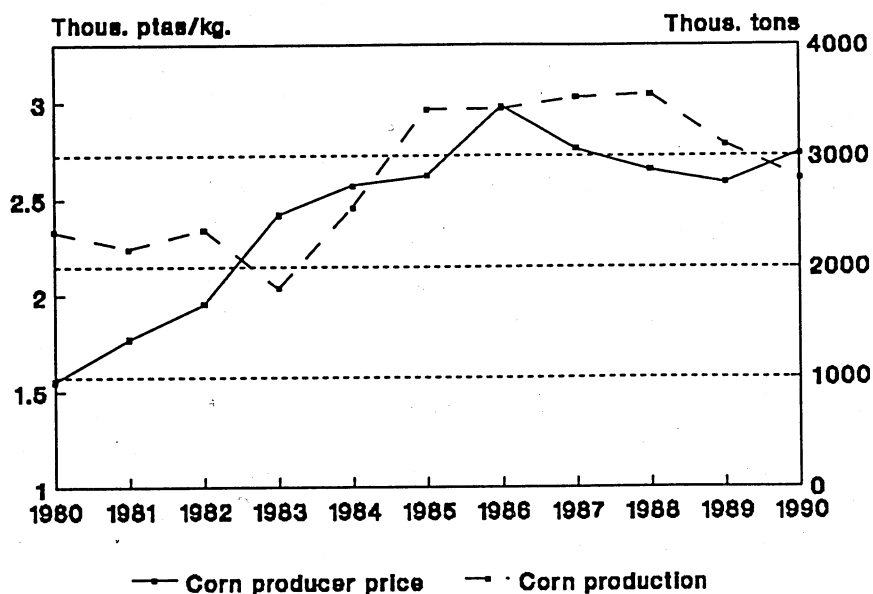
Most provisions of the CAP applied to Spanish producers immediately upon accession, although there was a transition period for internal

support prices. However, higher CAP prices were anticipated by the Spanish government, which began to raise support prices in the years preceding the official accession in 1986. In December 1985, the EC corn support price was only about 5 percent higher than Spain's support price. Under the terms of the Treaty of Accession, the EC intervention price would be adopted immediately when Spain's intervention price came within 3 percent of the EC intervention price. Spanish and EC intervention prices for corn and most other grains were aligned in marketing year 1988/89 (threshold prices had been adopted upon accession).

Spanish corn production rose only slightly following accession. Most of the increase in corn production took place prior to the actual date of accession in response to increases in the Spanish support price (fig. 1). Following accession, prices of other crops rose by more than corn prices, and the more profitable crops began to displace corn on irrigated land.

The import protection that maintains the EC's preference for its own products was put into place right away. While the Spanish support system was based on a threshold price that was lower than domestic support prices, the EC support system is based on a threshold price that is higher than internal support prices. Adopting the higher threshold price had little effect on domestic corn producers, who received an intervention price that was only slightly higher than the pre-accession price. But it had a significant effect on Spanish feed importers who had to pay much

Fig. 1--Corn price and production, Spain



Sources: Eurostat, USDA

higher prices for imported grain and on third-country suppliers who faced higher barriers to their corn exports. Non-EC exporters were immediately subject to an EC threshold price 55 percent higher than the corresponding Spanish price. Spanish grain importers shifted purchases of feed grains from the United States and other non-EC countries to EC member countries.

Spain also began to incorporate more of its own surplus grain--feed wheat and barley--into feed rations. The use of wheat as a feed grain had been discouraged by price policies that favored increased production of barley and corn to reduce Spanish dependence on imported feed grains. When feed grain prices rose further in anticipation of EC membership, feed use of wheat began to rise.

Spain's adoption of the CAP resulted in a shift in relative feed prices. The price of corn, wheat, and barley for feed all rose over the 1980's. However, since 1982, the corn price rose more rapidly than both wheat and barley prices (fig. 2). Another important development with EC membership was that non-grain feed ingredients became cheaper sources of energy (and some protein) than expensive grains. Feed compounders adjusted their rations, replacing grains with non-grain feed ingredients, especially manioc, corn gluten feed, and corn germ meal. Higher grain prices also made full-fat soybeans a more widely used feed ingredient.² As grain prices increased and livestock producers began to substitute lower cost ingredients, use of grains in compound feeds declined in Spain (table 3). Nonetheless, Spain still has the highest rate of incorporation of cereals in manufactured compound feed in the Community--54 percent in 1990 compared with 30 percent for the EC as a whole (CESFAC, 1991).

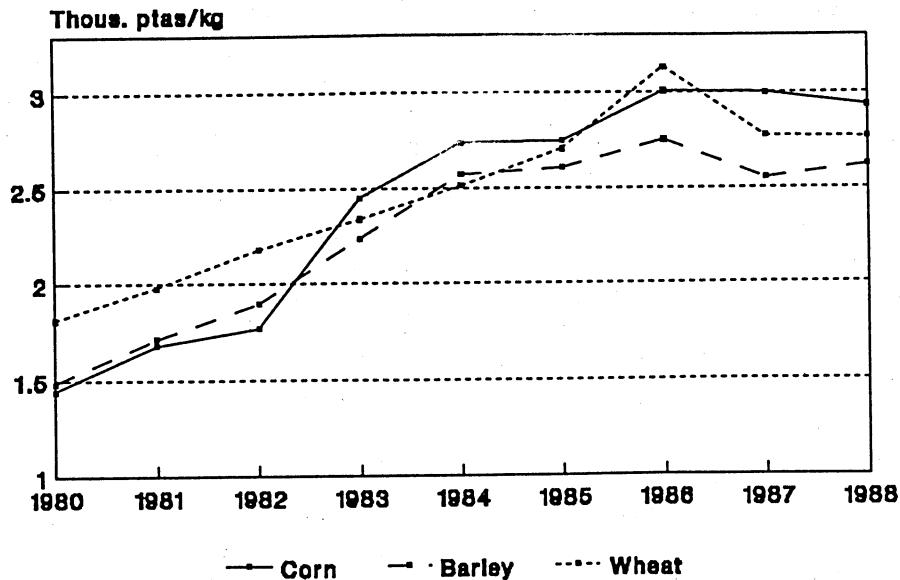
U.S.-EC Enlargement Agreement

Adoption of the CAP replaced Spain's bound duty of 20 percent on feed grains with the EC's variable levy, threatening to shut the United States out of the important Spanish market for feed grains. The United States sought compensation from the EC under the terms of GATT Article 24:6, which provides for compensation for countries who are injured by increased tariff rates that result from enlargement of a customs union. Corn and sorghum accounted for about 90 percent of the value of trade for which the United States had claims.

In 1987, the United States and the EC concluded an agreement that provides for minimum annual imports of at least 2 million tons of corn and 300,000 tons of sorghum into Spain. Imports of certain non-grain feed ingredients (corn gluten feed, distillers' dried grains, and citrus pulp) may count against the quota. Spanish

²Full-fat soybeans include the oil component of the soybean and use the oil to replace the energy of more expensive grains.

Fig. 2--Prices of feed grains, Spain



Source: Eurostat

Table 3--Average rates of incorporation of grain in manufactured compound feeds

Country	1984	1985	1986	1987	1988	1989	1990
	Percent						
Netherlands	15.6	18.1	13.9	12.1	12.4	12.9	13.3
Belgium/Lux.	26.0	24.0	21.6	18.1	16.0	13.8	14.7
Germany (West)	23.8	24.0	23.6	20.1	18.4	21.1	20.8
Portugal	66.4	52.0	37.9	30.1	22.9	21.6	21.1
Ireland	42.1	40.0	29.2	28.6	22.7	20.8	21.7
Denmark	40.5	39.5	33.3	29.3	28.6	29.8	27.7
France	48.1	45.6	39.6	33.7	31.0	31.4	31.9
United Kingdom	46.3	42.3	38.4	41.5	38.1	34.9	33.9
Italy	51.4	52.8	49.5	48.1	47.5	46.7	46.4
Greece (est.)	50.0	47.0	47.0	47.0	47.0	47.0	47.0
Spain	65.0	67.5	68.4	64.9	61.1	56.5	54.3
Total EC (without Greece)	--	--	35.3	32.6	30.1	30.1	30.0

-- = not available

Source: Confederacion Espanola de Fabricantes de Alimentos Compuestos para Animales (CESFAC). Memoria, 1991.

tariffs on other imports were also reduced as part of the agreement as compensation for lost U.S. sales. The agreement was originally signed for a period of 4 years (1987-1990), and has been rolled over annually since then.

The imports are realized through levy abatements on imported corn up to the amount of the quota. EC importers bid on the amount of levy reduction that they would be willing to accept to import grain from non-EC suppliers. The concession, in order to be legal under the GATT, must be made available on a non-discriminatory (Most-Favored-Nation) basis to all GATT signatories. However, the mechanics of the agreement favor corn imports from the United States. Most of the non-grain feed ingredients imported under the agreement are also of U.S. origin.

Under the original terms of the agreement, Spain must purchase the grain by December 31 of each year and ship the grain by February 28 of the following year. In most years of the agreement, arrangements have been made that extended the import deadline to April or May (table 4).

The timing of imports is largely determined by the way the Commission operates its levy abatement system. The corn import decision is not made until November or December, following the Spanish corn harvest, so that the EC can determine what its needs are, as well as to estimate the volume of non-grain feed imports during the year. The Commission issues tenders by late November for the balance of required imports under the agreement. Import certificates are granted by the EC Commission's Grains Management Committee, and are valid from January 1 through April 30. Imports must be completed (shipments must arrive) by April 30. As a result, non-grain feed imports are executed over the entire year, while corn and sorghum imports are bunched during the January-April period.

Table 4--U.S.-EC Enlargement Agreement deadlines

Agreement year	Delivery deadline
1987	June 30, 1988
1988	April 30, 1989
1989	May 31, 1990
1990	April 30, 1991
1991	April 30, 1992
1992	April 30, 1993

Source: FAS cables.

The timing of the import decision combined with the April 30 delivery deadline favors imports from the United States. The two other principal corn exporters, Argentina and South Africa, because of their location in the Southern Hemisphere, are just beginning to harvest corn in April. The lengthy shipping time between these origins and Western Europe makes it nearly impossible to complete delivery by the usual April 30 deadline. Argentina and South Africa tend not to carry over large grain stocks and are dependent on new crop supplies to meet the deadline.

Feed Submarket Policies

An important exception to the high import protection provided by the variable levy was a trade concession agreed to by the EC that allows most non-grain feed ingredients to enter the EC market duty-free or at low levels of duties. Non-grain feeds include manioc, corn gluten feed, corn germ meal, brans, sugar beet pulp, sweet potatoes, brewers' and distillers' grains, citrus pulp, and other fruit waste (Schmidt and Gardiner, 1988). Most of these non-grain feeds are produced outside the EC and either compete with or complement EC grains. High support prices for grains encouraged EC livestock producers and feed compounders to substitute less costly non-grain feed ingredients for expensive feed grains in their feed mixtures, exacerbating the build-up of EC grain surpluses.

Upon joining the EC, Spain adopted the same levels of import protection as the EC-10, including the favorable treatment accorded non-grain feed ingredients. Prior to 1986, Spanish restrictions on imports of non-grain feed ingredients kept these imports to a very low level--200,000 tons or less. Since accession, imports of non-grain feeds have expanded to over 1 million tons in 1989, and 1.5 million in 1990 (CESFAC, 1992). As the cost of grain rose with CAP prices, feed compounders sought to minimize costs by substituting non-grain feeds for grains in rations. Other non-grain ingredients, such as feed peas, alfalfa, and beans, are also being incorporated increasingly into animal feed.

Starch Submarket Policies

Most corn mills in Spain are wet-milling operations. Spain has the EC's largest wet-milling industry. In the rest of the EC, corn wet milling has been eclipsed by the rapid growth of the wheat starch industry. Wet millers in Spain use about 700,000 tons of corn annually. In contrast to much of the rest of the EC, Spain produces high-quality corn suitable for use in the wet-milling industry. Spanish plants use domestically produced or imported corn, depending largely on their location. Mills in Zaragoza and Campoebro, inland locations, use domestic corn, while mills at Barcelona and Laisa (near Valencia), which are close to ports, use imported corn.

Products of the wet-milling industry are covered under both the cereals and the sugar regimes. Isoglucose (high-fructose syrup) is a liquid sweetener that is a product of both wheat and corn starch production. Isoglucose is covered under the EC's sugar regime because it is a direct substitute for sugar in many applications. Starch, which is also produced by the wet-milling industry, is covered under a separate starch regime that is part of the EC's CAP for cereals.

The objective of the EC sugar policy for isoglucose is to control the level of isoglucose production so that it does not increase the quantity of surplus sugar that ends up being exported onto the world market. Like sugar, isoglucose is subject to an EC-wide production quota allocated to member countries. There are two levels of quotas on isoglucose, where the main difference between them is the size of the levy paid on the product under each quota. The Spain-EC Treaty of Accession set a quota that limited the Spanish corn wet-milling industry to production of 83,000 tons of isoglucose (dry matter basis).

Starch is made out of wheat and potatoes, as well as corn. It is used as an input both to the food and the nonfood industries. The starch regime compensates some starch users--primarily the chemical industry--for the higher prices they must pay for starch produced from higher priced EC cereals. A refund is paid that makes up part of the difference between world market prices and higher EC support prices for cereals. The refunds are paid only on products that do not already benefit from protection through variable import levies.

The main effect of EC policies on Spain's corn wet-milling industry has been to curtail its growth, and thereby restrict this market for imported, as well as domestic, corn. Prior to accession, the corn wet-milling industry was expanding in Spain, with production of isoglucose at 113,000 tons in 1984. As a result of the quota, wet-milling capacity is currently estimated to be about three times production.

Corn Supply and Utilization

Corn Supply

Supply is typically defined as the sum of domestic production, imports, and beginning stocks.³ Examining each of these component parts provides a good overview of corn supply in Spain. Moreover, given the importance of Spanish accession and adoption of the CAP,

³Beginning stocks are not a significant component of Spanish corn supply. Over the period from 1970-1992, beginning stocks comprised only 7-percent of annual corn supply, on average.

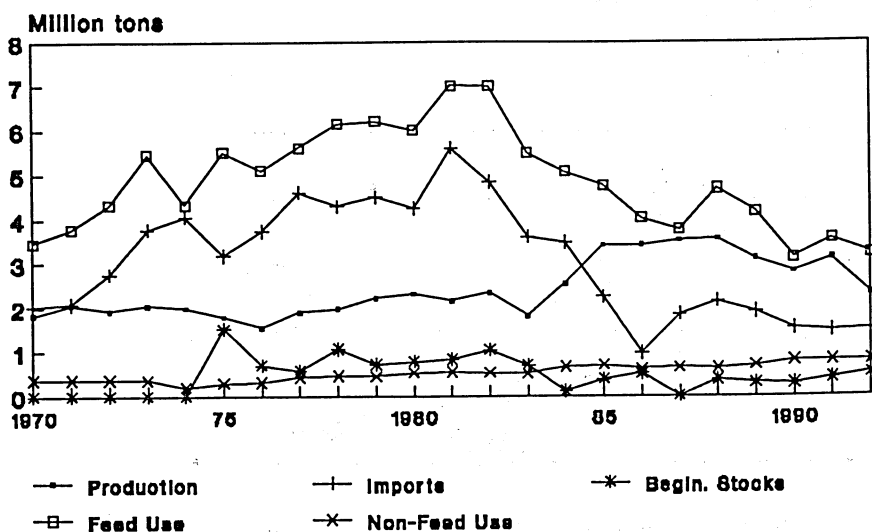
it is instructive to examine the derivation of corn supply in Spain, both prior to, and after accession.

Production.

Figure 3 graphs the components of corn supply between 1970 and 1992. The graph indicates that from 1970 through 1983, Spanish corn production averaged slightly less than 2 million tons per year. Corn production jumped from 1.8 million tons in 1983 to 3.4 million tons in 1985, as producers responded to upward adjustment of policy prices in preparation for accession in 1986.

Static production at the 3.5-million-ton level, from 1985 through 1988 reflects completion of Spain's policy price adjustment to EC levels as well as to lower producer prices in 1987 and 1988 (fig. 3). Since 1988, corn production has trended downward, due to drought and lower CAP intervention prices. Spanish corn production in 1992 was 2.3 million tons. Corn production in Spain is expected to continue to decline, due to the accelerated decline in intervention price levels for corn that was recently adopted as part of CAP Reform.

Fig. 3--Corn supply and utilization, Spain



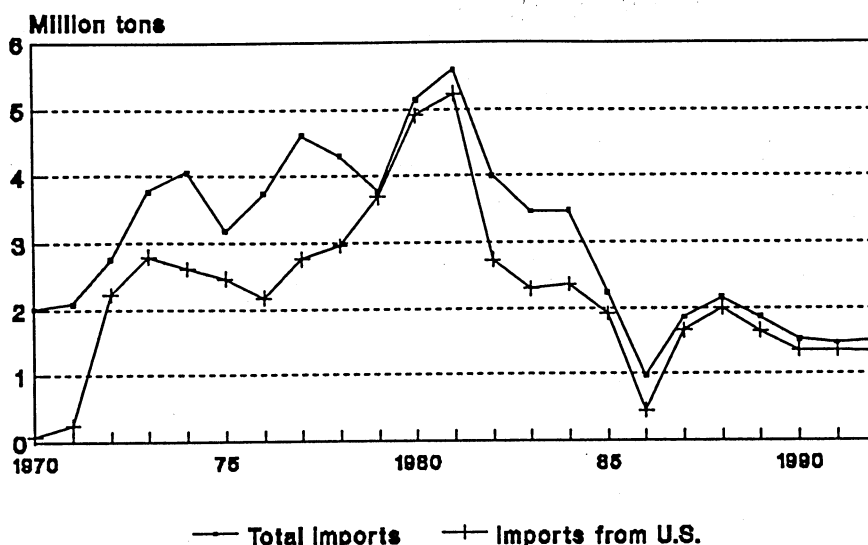
Source: USDA

Imports

Historically, Spain has been a net importer of corn. Although this was still the case in 1992, post-accession Spain imports far less corn than it did prior to 1986. Figure 4 indicates that annual Spanish corn imports averaged 3.7 million tons over the period from 1970 through 1981. Spanish corn imports peaked at 5.6 million tons in 1981, and declined to 977,000 tons in 1986, the year of Spanish accession to the EC. Imports increased to 1.9 million tons in 1987, the first year of the Enlargement Agreement. In each year since 1987, Spain has imported, on average, 1.7 million tons of corn from the United States, to satisfy its obligation under the terms of the Agreement. Spain imported 1.5 million tons of corn from the United States in 1992.

Note from table 5 that EC membership and adoption of the CAP have effectively reversed the relationship between corn production and imports in Spain. In the period from 1972 through 1981, production and imports accounted for 30 and 61 percent of Spanish corn supply, respectively. In the period since 1981, the percentages have reversed, with production accounting for 53 percent of supply, and imports constituting 40 percent of supply. The protective effects of the CAP have clearly been successful in decreasing Spanish use of imported corn. Moreover, it is a virtual certainty that the Enlargement Agreement has maintained Spanish corn imports at levels that would not otherwise be sustainable.

**Fig. 4--Corn imports, Spain
Total and U.S. origin**



Source: USDA

Table 5--Production and imports as percentages of Spanish corn supply, 1962-1992 averages

Decade	Production as a percent of supply	Imports as a percent of supply
	Percent	
1962-1971	43.6	56.5
1972-1981	30.3	61.0
1982-1992	53.2	39.5

Source: USDA

Corn Utilization

Feed Use

Corn is used in Spain primarily as an input into livestock and poultry feeds. The livestock and poultry feed industry has been the dominant corn user both before and since Spain's accession to the EC (table 6). Between 1962 and 1981, feed use accounted for more than 90 percent of total corn use in Spain. Average feed use has declined somewhat since 1981 however, accounting for 86 percent of total use over the 1982-92 period.

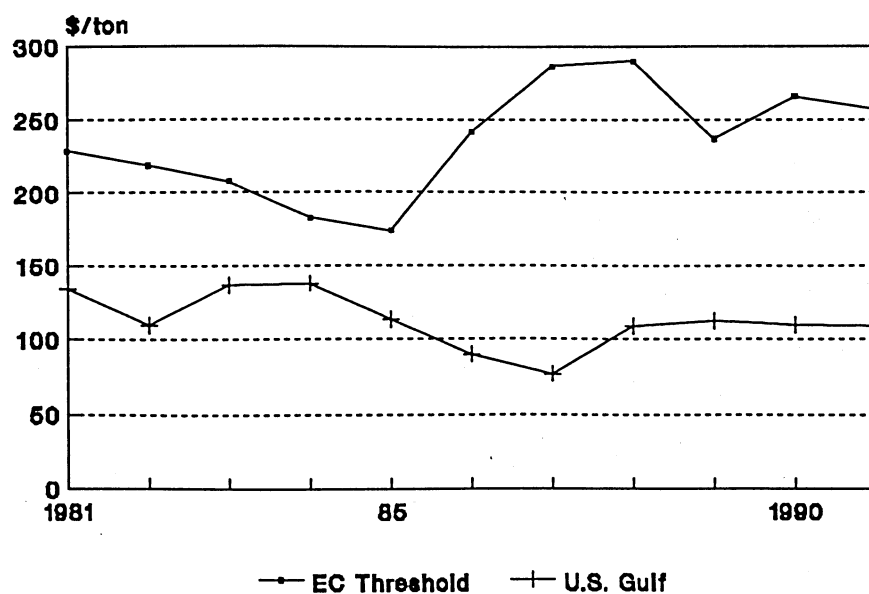
Declining feed use of corn is a rational economic response by Spanish feed manufacturers to the CAP mechanisms that hold domestic corn prices at levels far above the world price (fig. 5). For feed manufacturers in Spain, EC accession effectively removed imported corn as an economically viable feed input, in quantities greater than the 2.0 million tons allowed under the Enlargement Agreement. Spanish feed manufacturers responded to accession by substituting away from corn as a feed input, toward relatively less expensive energy sources such as wheat, barley and non-grain feed ingredients. The dynamics of Spanish feed manufacturers' substitution response to CAP-induced higher corn prices are illustrated in figures 6 and 7.

Table 6--Feed and nonfeed use as a percent of total corn consumption, 1962-92 averages

Decade	Feed use	Nonfeed use
1962-1971	95.2	4.8
1972-1981	93.5	6.5
1982-1992	86.1	13.9

Source: USDA.

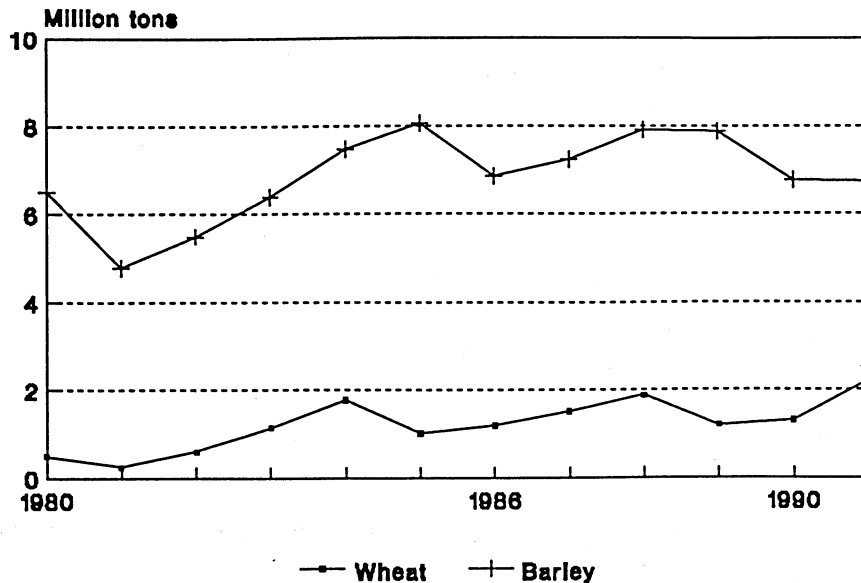
Fig. 5--EC and U.S. corn prices



Source: USDA

Figure 6 shows Spanish feed demand for corn, wheat, and barley from 1980 through 1991. The figure indicates that feed use of corn began to decline in the early 1980's, during Spain's transition to CAP policy prices. Spanish feed demand for corn declined through accession in 1986 and, as noted above, is presently around the 3-million-ton level.

Fig. 6--Feed grain utilization, Spain



Source: USDA

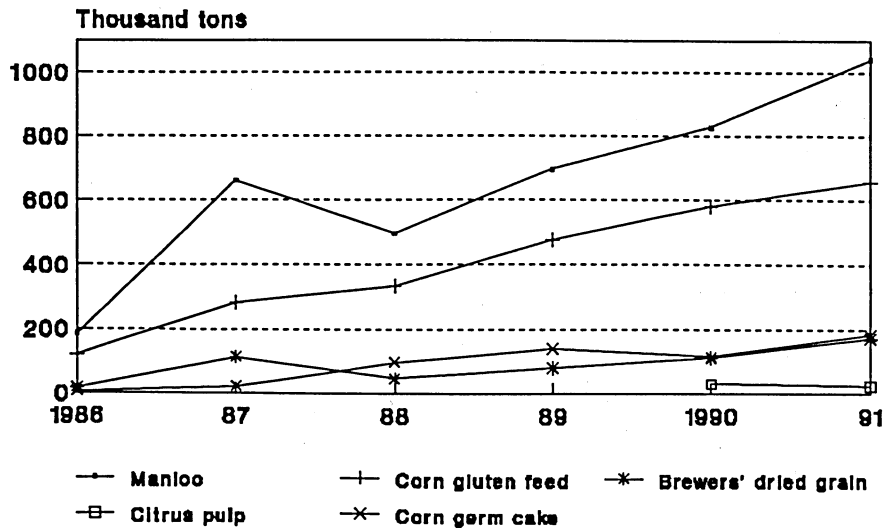
Feed demand for wheat and barley increased through the early 1980's. Spanish feed demand for wheat and barley increased as feed compounders began to substitute away from increasingly high-priced corn. Feed demand for wheat and barley declined in the mid-1980's, as feed manufacturers learned to use relatively cheaper non-grain feed ingredients as corn substitutes.⁴

Figure 7 shows the dramatic growth of Spanish imports of non-grain feed ingredients, since Spanish accession to the EC in 1986. As noted, Spanish accession and subsequent adoption of the CAP made it relatively less expensive for feed manufacturers to purchase energy sources in the form of non-grain feed ingredients, rather than in the form of imported corn. The non-grain feeds used in largest quantities by Spanish feed compounders are manioc, corn gluten feed, corn germ cake, brewers' dried grains, and citrus pulp.

The demand for corn and corn substitutes depends on feed demand by cattle, hogs, and poultry. Corn competes with nongrain feed in cattle feed, with barley and nongrain feed in hog feed, and with wheat and manioc in poultry feed. Spain's broiler industry is the

⁴ Conversation with staff of FAS Post, Madrid.

Fig. 7--Spanish imports of Non-grain feed ingredients



Source: USDA/FAS

largest single consumer of imported corn. The high fiber content of many nongrain feeds precludes their use in poultry rations. Cattle and hogs can use a greater variety of feeding materials in meeting nutritional requirements than can poultry. The Spanish dairy industry uses a higher proportion of manufactured feeds than other EC countries because Spain's arid climate limits forage production to certain northern coastal areas.

The dynamic that best characterizes the Spanish feed market since EC accession in 1986 is substitution away from corn. Substitution toward wheat, barley, and non-grain feed ingredients makes economic sense for Spanish feed compounders, because these feed components are not subject to EC trade barriers. Feed wheat and barley are produced both domestically and in other EC-member states, so that extra-EC imports of barley and wheat, which would be subject to the variable levy, are not applicable. Non-grain feed ingredients, although largely imported, are exempt from the variable levy. Indeed, substitution away from corn toward wheat, barley, and non-grain feeds has allowed continuation of growth trends established in the Spanish livestock and poultry sectors prior to accession.

Nonfeed Use

Nonfeed use for corn--industrial use and human consumption--represents a small but significant share of total use. While the feed industry continues to be the principal corn user in Spain, nonfeed use has more than doubled, from 6.5 percent of use over the 1972-1981 period, to 14 percent from 1982-1992.

In 1992, wet millers consumed 700,000 tons of corn. As noted above, the Spanish wet-milling industry is constrained to this approximate level of corn consumption by the EC isoglucose quota. The quota tends to favor the existing EC sugar industry by limiting production of sugar substitutes. Dry millers in Spain account for the balance of nonfeed corn demand. In 1992, 120,000 tons were dry-milled in Spain.

The Feed Sub-Market

Spanish livestock and poultry production and consumption data for the period between 1960 and 1992 are set out in figures 8 through 11. Each figure shows strong, positive growth trends that continue into the 1990's, although with some variability. On the supply side, the livestock-poultry industry's rapid adoption of technological advances in feed compounding and production methods allowed production to accelerate between 1960 and 1992. Growth of the Spanish livestock-poultry sector corresponded with increased consumer demand for meat and eggs, that resulted from increased income from a growing Spanish economy.

Beef

Spain does not produce or consume major quantities of beef and dairy products compared with the United States and most other EC countries. In 1992 Spain produced 490,000 tons of beef, making it the seventh largest producer in the EC. Beef and dairy production is limited in Spain primarily by lack of rangeland, and by the hot and arid climate. Moreover, Spanish consumers have demonstrated little preference for beef. Absence of a taste-preference for beef is income-related to some degree, but also clearly indicative of a population that simply prefers pork and poultry meats. In 1992, Spanish per capita beef consumption was 28 pounds. By comparison, per capita consumption in the EC and the United States was 49 and 97 pounds, respectively.

Table 7 sets out average growth rates of key parameters of the Spanish beef industry. Beef production expanded at an average annual rate of 5 percent in the 1960's in response to government policies to increase the standard of living of the Spanish population. During this period, the government instituted policies that opened the Spanish economy to foreign investment. Large multinational agribusiness companies were among those that established a presence in Spain, and facilitated transfers of technology to the Spanish livestock-poultry industry.

Table 7--Spanish beef industry: Annual growth rates,
1960-1992 averages

Period	Production	Consumption	GDP growth
	Percent		
1960-69	5.4	8.7	7.8
1970-79	2.8	0.6	4.0
1980-85	-1.0	0.2	1.4
1986-92	1.5	1.7	4.3

Source: USDA

The growth rate of beef production slowed in the 1970's, and declined into the mid-1980's, a development that corresponds with reduced real GDP growth rates. Production growth recovered to positive rates following accession, and has continued into the 1990's. Variability of Spanish beef production has increased since the late 1980's (fig. 8). The increased variability is attributable to variability in producer prices, feed costs, and weather (drought) conditions.

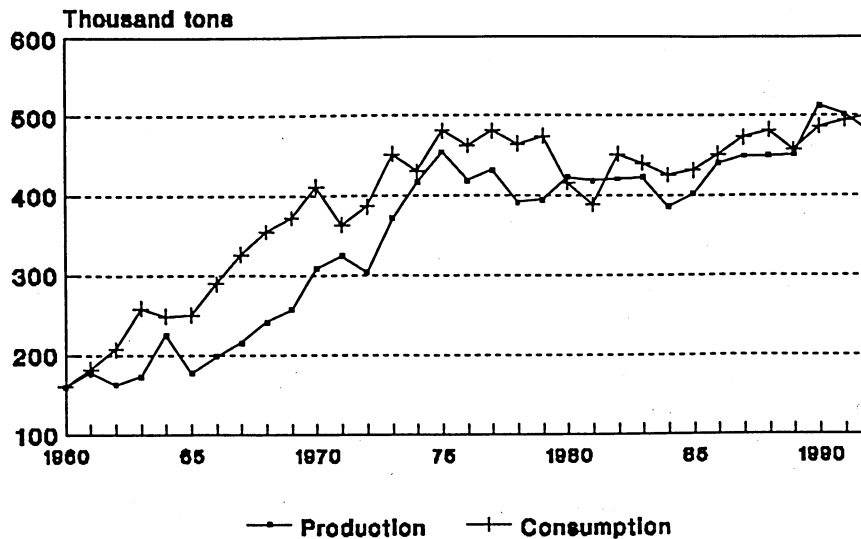
Spanish consumption of beef grew rapidly in the 1960's, corresponding with the period of economic growth and expanding production. Consumption declined over the decade of the 1970's, through to the mid 1980's. Following accession, beef consumption increased, corresponding with more rapid economic growth.

As indicated above, Spanish consumers are not avid beef consumers, but Spain has been a small net beef importer from 1960 through 1992 (fig. 8). Only in 1980 and again in 1992, was Spain a net exporter of beef. Over time, Spanish beef imports have declined, with domestic production satisfying a greater proportion of consumer demand.

The mechanics of beef production in Spain are not unlike those in the United States. Beef production in Spain is typically a two-step operation, where 70 percent or more of production begins in feeder-calf operations, followed by a finishing period in feedlots. Feeder-calf operations are located primarily in Andalusia, Extremadura, and in northern regions of Spain. Feeder calves are then trucked to feedlots, which are typically medium-sized by U.S. standards, feeding about 500 head, on average. Feedlots in Spain are located within proximity to large port facilities, primarily in Catalonia for optimal access to large feed mills.⁵

⁵Conversation with staff of FAS Post, Madrid.

Fig. 8--Beef production and consumption, Spain



Source: USDA

Cattle presently account for about 600,000 tons, or 16 percent of feed demand for corn in Spain. Of this total, beef cattle consume approximately 200,000 tons, and dairy cattle consume roughly 400,000 tons.⁶ Cattle's 16-percent share of total feed demand for corn, is unchanged from the pre-accession period.

Prior to accession, beef cattle consumed, on average, 400,000 tons of corn per year, and dairy cattle consumed 500,000 tons. The sum, 900,000 tons, implies that cattle accounted for roughly 16 percent of feed demand for corn that averaged 5.3 million tons over the 15-year period prior to accession.

Although EC accession appears to have had little effect on the proportion of corn use in total cattle rations, an interesting sign of post-accession Spain's substitution away from corn is apparent from quantity changes in corn consumption by beef cattle. As noted, beef cattle are currently consuming roughly 200,000 tons of corn as feed, down from the 400,000-ton levels that characterized pre-accession Spain. The 50-percent decrease in the quantity of corn fed to beef cattle is another indicator of how, in the period since accession, Spanish feed manufacturers have learned to compensate for higher corn prices by securing energy and protein in

⁶Conversation with staff of FAS Post, Madrid.

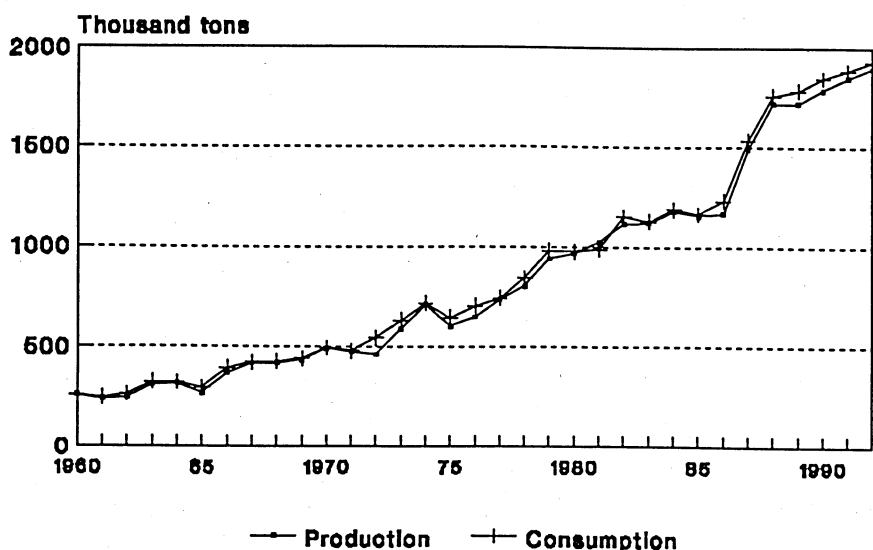
such forms as barley, wheat and non-grain feeds, rather than in the form of corn.

Pork

Spaniards have a cultural affinity for pork, both in the form of Serrano ham, as well as for certain fresh pork cuts.⁷ Consumer preferences have been well accommodated by the Spanish pork industry (fig. 9). Pork production in Spain has trended upward since the mid-1960's. Increases were dramatic upon accession in 1986. Production increases were largely attributable to CAP livestock pricing policies, increased consumer demand, and adoption of innovations in feeding and production technology.

Growth rates computed for the Spanish pork industry in table 8 indicate that over the 1960 to 1992 period, average annual production growth exceeded 6 percent per year. The only exception to this trend was the 5-year period just prior to accession, when Spanish economic growth had slowed considerably. Growth rates of production tend to correspond with growth in Spanish pork consumption, which in turn, appears to rise and fall with domestic income growth (table 8).

Fig. 9--Pork production and consumption, Spain



Source: USDA

⁷Conversation with staff of FAS Post, Madrid.

Table 8--Spanish pork industry: Annual growth rates,
1960-1992 averages

Period	Production	Consumption	GDP growth
	Percent		
1960-69	6.0	5.0	7.8
1970-79	7.5	6.8	4.0
1980-85	3.6	3.0	1.4
1986-92	9.7	8.7	4.3

Source: USDA

Pork production operations in Spain essentially fall into two categories: the first is characterized by very large (1000 animals or more), state-of-the-art production facilities. This type of facility accounts for more than 50 percent of pork production in Spain (EC Commission, 1992). Very large pork producers include multinational grain corporations with major pork-producing facilities in Spain, as well as large, highly integrated, producer-owned cooperatives. The second category of pork producer includes small to medium-sized facilities, operating at various levels of production scale and technology. These facilities are typically run by individual producers, operating independently of multinationals and co-ops.

The two-category structure of the Spanish pork production industry was brought about by the entry of large multinational feed manufacturers in the late 1960's, and into the 1970's. Over the past three decades, these companies have been very successful in introducing new technology, investment capital, and scale economies into Spanish pork production operations. Adoption of new production and feeding practices has undoubtedly enhanced pork producers' ability to accommodate expanding consumer demand.

Pork production operations in Spain tend to be located in the vicinities of large port facilities. Such proximity minimizes transport and handling costs of mixed feeds, which are compounded largely from imported feed ingredients. Major pork-producing regions in Spain include Segovia, Toledo, Huesca, the area around Cartagena, and throughout Catalonia.

Since Spanish accession to the EC, the absolute quantity of corn fed to hogs has declined, while the proportion of feed demand for corn attributable to hogs has increased. Prior to accession, hogs consumed roughly 2 million tons of corn per year, or approximately 36 percent of feed demand for corn. Presently, hogs consume 1.5 million tons annually, about 40 percent of feed demand. The rising proportion of corn demand attributable to hogs, 36 vs. 40 percent,

occurred because absolute quantities of corn fed were falling faster than demand for corn by hog feeders.

In comparing the proportions of feed demand attributable to hogs prior to and following accession, the key point is that less corn is being fed to a far larger number of animals in post-accession Spain. Hog production was 1.157 million tons in 1985; in 1992 production was 1.928 million tons. Substitution of the Spanish hog production industry away from corn, and toward relatively cheaper non-grain feeds, is consistent with the case of Spanish beef production, and is attributable to the Common Agricultural Policy, which discourages domestic use of imported feed grains and supports EC cereal prices above world market levels.

Poultry/Eggs

The balance of feed demand for corn in Spain is largely accounted for by poultry and egg production. Poultry (broiler) meat is extremely popular in Spain. Poultry is considered by Spanish consumers to be a relatively economical protein source, with highly desirable dietary characteristics, as well.⁸ Per capita consumption statistics show that Spanish consumption of poultry was 128 percent of EC-10 consumption in 1988 (table 9). Within Spain, consumers eat roughly twice as much poultry as beef, but only half as much poultry as pork.

As with pork production, the poultry/egg industry has expanded significantly since the 1960's (figs. 10 and 11). The poultry/egg production industry in Spain is also similar to the pork industry, in that growth in broiler production was brought about by government policies initiated in the 1960's to induce the industry

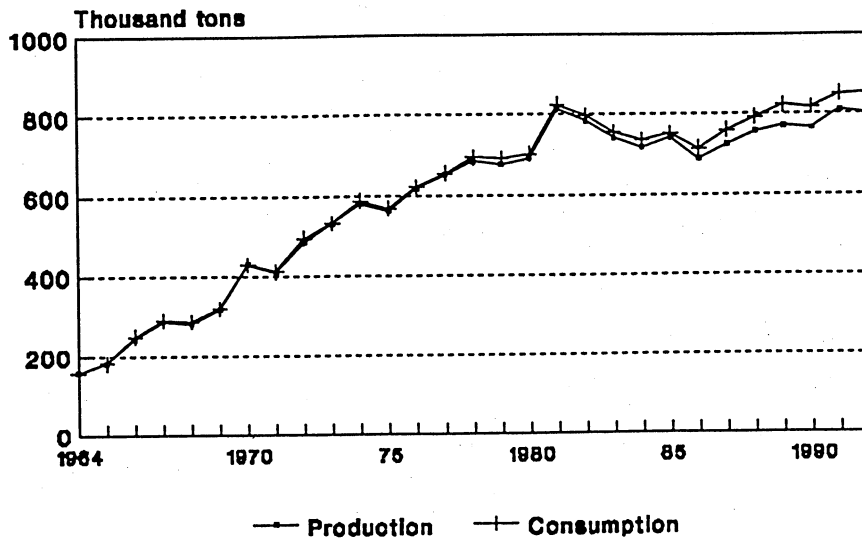
Table 9--Per-capita consumption of meat, 1988

Type	EC-10	Spain
		<u>Kgs.</u>
Pork	39.6	44.6
Beef/veal	24.5	11.4
Poultry	17.0	21.9
Sheep/goat	3.6	5.7
Other	8.8	9.1
Total	93.5	92.7

Source: Eurostat, *Agriculture Statistical Yearbook*, 1990

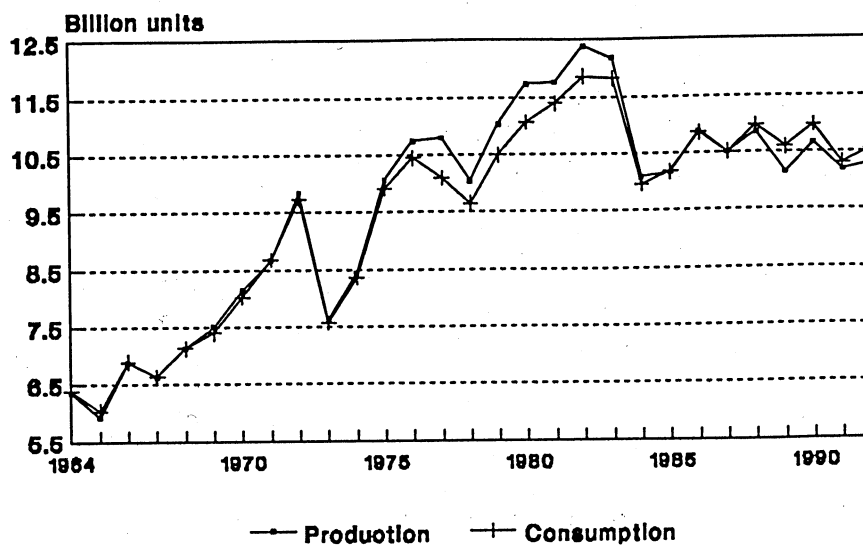
⁸Conversation with staff of FAS Post, Madrid.

Fig. 10--Broiler production and consumption, Spain



Source: USDA

Fig. 11--Egg production and consumption, Spain



Source: USDA

to increase investment and to adopt technical innovations in feeding and production. The increase in productive capability corresponded with an expanding economy and increasing consumer demand for poultry and egg products. Growth rates of poultry and egg consumption for the period of 1964-1991 appear in tables 10 and 11.

The structural dynamics of the poultry/egg production industry in Spain are similar to those of the Spanish pork industry. Presently, the structure of the Spanish poultry/egg production industry is dominated by very large facilities that utilize state-of-the-art technology to optimize operations. This structure is largely the result of entry into Spain of large, multinational feed manufacturing companies in the late 1960's and early 1970's. As in the case of pork production, the technology and financial capital introduced into the Spanish poultry/egg production industry by the multinationals induced a restructuring toward large, vertically integrated operations. FAS estimated that from 80 to 90-percent of broiler and egg producers in Spain operate large, capital intensive facilities.

Table 10--Spanish broiler industry: Average annual growth rates

Period	Production	Consumption	GDP Growth
Percent			
1964-69	14.9	13.8	7.8
1970-79	5.2	5.5	4.0
1980-85	1.5	1.4	1.4
1986-91	3.3	3.3	4.3

Source: USDA

Table 11--Spanish egg industry: Average annual growth rates

Period	Production	Consumption	GDP Growth
Percent			
1964-69	3.4	1.9	7.8
1970-79	3.5	2.0	4.0
1980-85	-2.8	-2.2	1.4
1986-92	-1.3	-1.2	4.3

Source: USDA

The structure of the poultry production industry in Spain is similar to that of both pork and beef production, in that poultry production facilities are located in the vicinities of large port facilities. As with livestock production, poultry production operations are so located in order to gain proximity to feed-manufacturing plants, which are in turn dependent on imported grains and non-grain ingredients as feed inputs. Poultry production in Spain is currently centered around Galicia and Catalonia.

The quantity and proportion of feed demand for corn attributed to poultry and egg production has declined since Spanish accession. On average, poultry accounted for approximately 2.5 million tons, or 45.5 percent of feed demand prior to accession. In 1992, poultry consumed roughly 1.6 million tons, or 43 percent of feed demand for corn.⁹ The reduction in quantity and proportion of corn fed to poultry is due to Spanish adoption of the CAP, and to changes in consumer preferences.

An interesting secondary effect of Spain's joining the EC involves consumer preferences regarding poultry. Spanish consumers traditionally had a distinct preference for poultry meat with yellow color (Hiemstra, 1987; Brown, 1988). This preference favored Argentine exporters who sell primarily flint corn, which has a higher carotene content, and disadvantaged U.S. exporters who sell primarily dent corn, which is high in starch content. The carotene content of flint corn gives chicken meat its yellow color and imparts a dark yellow color to egg yolks. Following accession, feed compounders were able to use feed wheat in their rations, which, when fed to poultry, produces white meat. Consumers began to prefer the white-meat chicken, and came to associate the yellow color with fat. As a result, Argentine flint corn is no longer highly desired by the broiler industry, a large user of corn.

Market Growth Projections

The market for corn in Spain is dominated by the feed sector, and to a lesser extent by the wet-milling industry. The EC's quota on isoglucose, a main product of wet milling, should limit the growth of the wet-milling industry in Spain. Growth in demand for corn in Spain will depend on the development of the livestock industry, as well as on developments in relative prices of competing feed ingredients. There is room for expansion of the Spanish livestock sector: Per capita income is low compared with that of Spain's EC partners. Per capita meat consumption, while close to the EC average, is lower than that of the more affluent member countries of the EC and the United States. There are likely to be opportunities to increase consumption of meat as Spain's economy expands. It is unlikely that Spanish demand for meat will expand

⁹Conversation with staff of FAS Post, Madrid.

significantly as the result of population growth--Spain's population is growing at a slower rate than that of the EC as a whole, due to a relatively low birth rate and net outmigration.

The main event affecting the evolution of relative feed prices is the program of reform of the CAP for grains and other arable crops implemented in 1993. Support price cuts under the new arable crops regime will make corn less competitive on irrigated land relative to crops not included in the arable crops regime, like cotton. Corn production is likely to decline as producers substitute away from corn toward crops that are more profitable to produce on irrigated land. And, because of corn's moisture requirements and the lower payments on nonirrigated corn area, it is not likely to expand on nonirrigated land. The requirement to set aside a part of the arable land base to qualify for direct payments will contribute to smaller corn production in Spain because there is a specific corn set-aside for corn base areas. However, the set-aside requirement will have a smaller impact on reducing corn production in Spain than in the rest of the EC because of the predominance of small producers in Spain, who are exempt from the set-aside requirement. Lower feed grain prices are expected to produce a shift in feed use in favor of domestically produced grain at the expense of non-grain feed ingredients. The shift toward grain will be less pronounced in Spain, which already uses a high proportion of grain in compound feed. The program of reform will not directly affect import protection, thus imported corn will remain expensive relative to alternatives.

The main determinant of the market for imported corn will continue to be the U.S.-EC Enlargement Agreement. This agreement was extended through 1993 as part of the Blair House accords between the United States and the EC in November 1992. The future of the Enlargement Agreement, which is unpopular among some groups in the EC, is uncertain.

The Corn Purchase Study in Spain: Review of the Survey Results

The Corn Purchase Study was conducted in Madrid and Barcelona, Spain, in early June, 1992. Upper-level managers of seven agribusiness firms answered questions during interviews that lasted for up to 2 hours, about their firm's corn use, sourcing criteria, quality preferences, and broken corn and foreign material (BCFM)¹⁰ concerns. Firms participating in the study included a co-op, a wet miller, a feed manufacturer/livestock producer, and four

¹⁰ Broken corn and foreign material is defined in the U.S. standards for corn as, "All matter that passes readily through a 12/64 round-hole sieve and all matter other than corn that remains in the sieved sample after sieving...."

multinational grain companies. Two of the four grain companies, and the co-op, also engage in feed compounding and/or livestock production operations in Spain. In terms of size of the participating firms, survey respondents each placed their enterprises among the top five firms with comparable operations in Spain.

Sourcing Criteria

There was a high degree of uniformity to the structure of firm responses to sourcing criteria questions. Responses did not vary in any significant way, regardless of whether a multinational grain importer, a wet miller, a feed compounder, or a livestock producer was being interviewed. When asked what factors were determining in their decisions to import corn, each of the survey respondents cited the Enlargement Agreement. Each respondent indicated unequivocally that the economic feasibility of significant imported corn-use derives exclusively from the existence of the Enlargement Agreement. Participants agreed that in the absence of the Agreement, extra-EC corn imports by Spain would approach zero.¹¹

Additional sourcing criteria were cited by six of the seven survey participants (table 12). Respondents from one multinational grain importer, the feed compounder/livestock producer, the co-op, and the wet miller, each cited price and quality as factors important to them in deciding from which supplier-countries to import corn. Two multinational grain importers cited price and trade servicing as important sourcing criteria.

Each of the respondents who cited quality as a sourcing criterion uniformly ranked the characteristics of Argentine corn above those of U.S. corn. Survey respondents citing price as a sourcing criterion gave a top ranking to both the United States and Argentina, noting that pricing advantage changes within the crop-years of each exporting country. The two importers who cited trade servicing as a sourcing criterion each ranked the United States above Argentina.

If quality is indeed an important sourcing criterion, and the respondents consider Argentine corn to be of superior quality, then participants' responses would appear to be at odds with EC

¹¹In the event of expiration of the Agreement, the wet miller indicated that he would likely import corn from France for use in his plant. Feed manufacturers suggested that expiration of the Enlargement Agreement would simply serve to complete the process of substitution away from corn that has been ongoing since the early 1980's in anticipation of Spanish accession. They indicated that wheat and non-grain feed ingredients would substitute for corn in the event of expiration of the Enlargement Agreement.

Table 12--Exporter-country rankings assigned to sourcing criteria by Spanish importers

Sourcing criteria	Cited by	Top ranking exporter-country
Quality	Multinational grain co.	Argentina
	Feed compounder/livestock producer	Argentina
	Co-op	Argentina
	Wet miller	Argentina
Price	Multinational grain co. (3)	Argentina/ United States
	Feed compounder/livestock producer	
	Co-op	
	Wet miller	
Trade Servicing	Multinational grain co. (2)	United States

statistics that indicate that more than 90 percent of corn imported into Spain is of U.S. origin. The demonstrated tendency of the survey respondents to import U.S. origin corn, while preferring the quality characteristics and (often lower) prices associated with Argentine corn, is largely attributable to the Enlargement Agreement mechanics.

In addition to Enlargement Agreement mechanics, other factors, such as crop year dynamics, an integrated grain storage system, and favorable location, together give a comparative advantage to U.S. corn from January through April of the crop year. During this 4-month period, U.S. exporters are able to fill Spanish orders by drawing corn from an extensive system of storage facilities in the United States. The Argentine corn crop, on the other hand, is harvested in the spring months, and is largely reliant on immediate disposition, domestic use or export, due to an absence of a developed system of grain storage facilities. Thus in the January through April period, when the Spanish are typically fulfilling their Agreement obligations, crop year dynamics and a well-developed grain storage system, together yield a price advantage to U.S. corn.

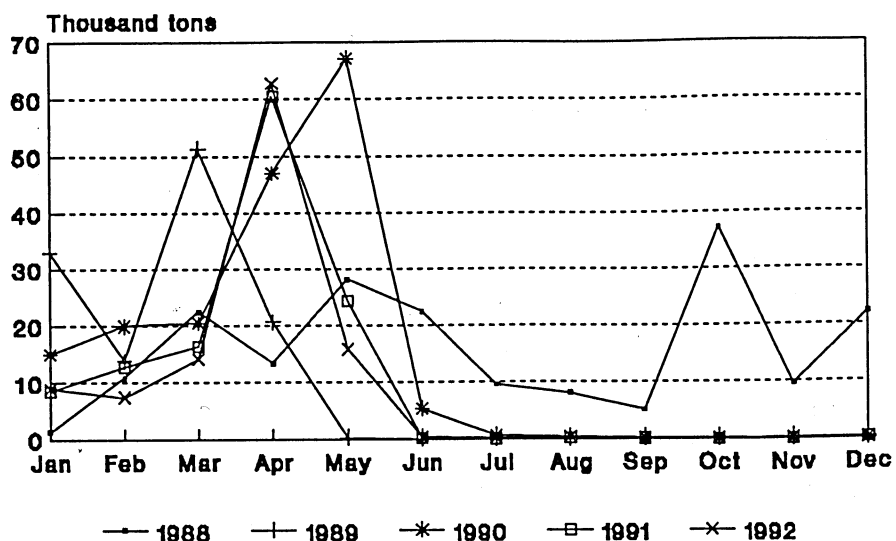
Moreover, Spanish corn buyers indicated that location also favors U.S. corn during their 4-month buying period. A representative of one of the multinational grain importers noted the existence of a

\$6 freight difference between U.S. and Argentine corn during the January through April period. The importer stated that this cost difference is a contributing factor in his decision to import U.S. corn between January and April. He further indicated that he typically switches his purchases to Argentine corn by mid-April, when post-harvest supplies have eliminated between-country cost differences.

The buying practices described by the importer were representative of the practices of the other survey respondents. Corn users buy non-EC corn from January through April, to satisfy Spain's prior-year obligation under the Enlargement Agreement. During this period, freight and availability favor U.S. corn over the positive quality characteristics associated with Argentine corn. Spanish sourcing decisions thus appear to be dominated by evolved buying practices under the Enlargement Agreement, together with crop-year dynamics, to a greater extent than by quality characteristics.

Monthly Spanish purchases of U.S. corn are depicted in figure 12. The graph shows that Spanish corn purchases are heavily skewed toward the first 3 to 4 months of the calendar year. The import data thus appear to corroborate the responses of the survey participants.

**Fig. 12--Spanish imports of U.S. corn,
Monthly, 1988-1992**



Source: Eurostat

Quality Preferences for Imported Corn

The representatives of each firm that participated in the survey were asked to cite the quality characteristics important to them when contracting for foreign corn. Their responses are largely determined by their intended use for the grain. The survey responses indicate that importers focus almost exclusively on physical characteristics, while feed manufacturers and the wet miller appear to value a broader set of quality characteristics.

The multinational grain importers act as conduits between foreign suppliers and domestic corn users in the Spanish market. Consequently, the quality characteristics that importers see as the most important reflect their preferences as well as those of their customers. Importers who participated in the survey indicated that their major customers are feed manufacturers and millers.

Corn imported into Spain is typically stored for short periods by the importer as well as by the user. For this reason, both importers and users indicated in their survey responses that physical quality characteristics facilitating optimal storage, such as low BCFM and moisture, were very important to them. Importers and corn-users participating in the survey emphasized their particular concern with BCFM in the context of its association with conditions that lead to storage elevator explosions.

The survey responses indicate that three of the four participating importers considered BCFM levels to be the most important quality factor when buying corn from a foreign supplier. Additionally, three of the importers ranked moisture as a critical quality factor when importing corn. One importer also cited fractionating properties as an important characteristic. Finally, one of the four participating importers assigned some importance to test weight and damage characteristics.

Users of imported corn who participated in the survey indicated that both physical attributes and intrinsic characteristics are critical factors when buying foreign corn. Representatives from the wet miller and the co-op considered BCFM to be the most important factor associated with purchasing imported corn. The wet miller attached secondary importance to corn hardness, moisture, oil content, and starch content, as factors in buying imported corn. The co-op, which buys corn for its feed-compounding operations, attached secondary importance to heat damage and moisture.

The feed compounder/livestock producer attached uniform importance to physical, wholesomeness, and intrinsic characteristics of imported corn. The firm's representative indicated that such factors as BCFM, damage, moisture, test weight, presence of insects (live/dead), aflatoxin, odor, protein, hardness, and presence of

certain chemical compounds that tend to color the meat of feeding poultry, are all important when buying imported corn.

The survey responses indicate that while corn-users assigned considerable importance to intrinsic and wholesomeness characteristics of imported corn, of principal importance are such physical characteristics as BCFM and moisture. Indeed, as noted, BCFM was designated as the most important corn characteristics by two of the three interviewed corn users, and by three of the four multinational grain importers. The BCFM factor thus appears to function as the common focus of Spanish importers and corn-users. The concern with elevated levels of BCFM indicated by surveyed corn importers and users, however, apparently does not translate into special contracting practices.

Contracting Practices and BCFM Concerns

Survey responses indicate that while each participating importer and the co-op contract for maximum limits on moisture, none of the survey respondents make any special contract provisions for BCFM. The importers indicated that they contract for No. 2 or No. 3 corn, with between 14.5- and 15.5-percent moisture. The representative from the co-op indicated that the co-op typically contracts with their supplier for No. 2 corn, with 13 percent moisture, and maximum 3 percent black/dark kernels.

When queried about the absence of special contract provisions for BCFM, in light of the expressed importance attached to it, survey respondents indicated that the BCFM levels associated with U.S. No. 2 and No. 3 corn are acceptable to them. With regard to BCFM percentages in imported U.S. corn, the respondents consistently stated that objections and formal complaints arise only when contract limits for BCFM are exceeded. All respondents maintained that while BCFM levels on imported U.S. corn are currently within contract limits, past contract performance left them all wary of purchasing U.S. corn.

The survey respondents presented a set of anecdotes that together suggest that, "...5 or 6 years ago...", some shipments of US corn into Spain did indeed exceed contract limits on BCFM.¹² All respondents expressed satisfaction, however, with the present quality of U.S. corn being imported into Spain. They maintained that it is neither necessary to specify BCFM levels below present contract levels, nor ever financially feasible to consider doing so. But the survey respondents were equally consistent and most emphatic about what they want when they buy U.S. corn: They want

¹² Several survey respondents indicated extreme reluctance, even now, to accept U.S. corn shipped from ports along the Atlantic coast, and particularly the St. Lawrence Seaway.

the characteristics of the delivered corn to meet contract specifications.

Attitudes Toward BCFM

In responding to questions that pertained specifically to BCFM, participants essentially reiterated the concerns that were expressed in the context of contracting practices. All survey respondents indicated that BCFM is a concern to their firms. All pointed to storage problems and increased likelihood of explosion, when asked to identify the problems that derive from elevated BCFM levels. The representatives of all firms participating in the survey indicated, however, that BCFM creates an immediate problem only when contract levels are exceeded.¹³ They expressed satisfaction with levels of BCFM presently coming in with U.S. corn, and thus saw no net financial benefit to contracting for BCFM below the levels specified in the grade standards for No. 2 and No. 3 U.S. corn.

Corn-Cleaning Practices

Corn-cleaning practices appear to be determined largely by the intended end use of the grain. Thus it was not surprising to learn that the wet miller subjected incoming corn to the most exacting cleaning standard. The cleanliness standard of the wet miller is dictated by the milling process itself. The process is obviously quite technically sophisticated, with the bulk of the milling product going to human consumption. The feed manufacturers participating in the survey indicated a lower cleanliness standard, as their products are consumed by animals. For participating importers, the cleanliness standard is not uniform across firms operating in Spain. Whether or not an importer cleans incoming grain appears to be determined by the importer's customer demands.

Of the four participating multinational grain importers, three do not clean imported corn. Such proportionality is consistent with expectations, since 86 percent of the Spanish corn supply is utilized in livestock and poultry feeds. One multinational corn importer reported his firm's practice of cleaning some incoming corn. The importer's representative indicated that the firm found it necessary to clean in order to remove "brokens" from corn destined for sale to industrial users, that is, corn millers.

¹³ Spanish buyers of U.S. corn typically purchase No. 2 and No. 3 corn, for which U.S. grain standards allow BCFM levels of 3 and 4 percent, respectively. Contract limits for BCFM are thus exceeded for No. 2 corn when BCFM is greater than 3 percent. For No. 3 corn, contract limits are exceeded when BCFM exceeds 4 percent.

This importer indicated that the marketed screenings derived from the firm's cleaning process net approximately 50 percent of the market price of corn. Presently, the firm has no particular difficulties in disposing of the screenings, although the respondent recognized that disposal could become costly, as environmental concerns are becoming public policy issues in Spain. The importer had no estimate of his firm's cleaning costs, nor was he willing to speculate as to what those costs might be.

When asked to provide average BCFM levels for incoming corn of U.S. and South American origin, the importer responded by noting that U.S. corn generally comes in at contracted-for levels, although the variance of BCFM continues to be quite high. He further expressed the view that BCFM levels at discharge in Spain are often higher than at loading in the United States. When asked for a comparable range on BCFM for South American origin corn, the importer indicated that the BCFM percentage on incoming Argentine corn is typically less than 1 percent. The reason for this, he suggested, is because Argentine corn is essentially loaded right out of the field. Argentina has few storage facilities, and so upon harvest the corn is transported directly to domestic users or to export shipment points.

The plant manager of the wet mill offered the most complete description of the cleaning process. The miller indicated that the market currently values screenings at approximately \$90 per ton. He offered no estimate of the costs associated with disposing of screenings, but he did suggest that increasingly strict environmental regulations were adding to the costs of screenings disposal. The miller commented that significant quantities of dust are associated with screenings, and that air pollution regulations have become a factor in its disposal.

The plant manager reported that there existed no established cleanliness requirement for his mill, but he indicated that every effort is made to clean incoming corn to zero percent BCFM. He estimated the cost of cleaning to be approximately almost \$9 per ton. When questioned about the average BCFM levels received in corn of different supplier-country origins, the plant manager indicated that the range on average BCFM of U.S. corn delivered to his plant is anywhere from 6 to 10 percent. He reported the comparable range for average BCFM for South American origin corn is between 2 and 3 percent.

Implications for Restricting Allowable BCFM Percentages

To gain some insight into the BCFM elasticity of Spanish demand for U.S. corn, the interview included questions that related corn price to BCFM levels. The firms interviewed were asked if they were willing to pay more for cleaner corn. They were then asked if their firms would demand greater quantities of U.S. corn if BCFM levels were lower. To each question all respondents answered in

the negative. Because all respondents expressed satisfaction with current grade standards--when those specifications are met in delivered shipments--they expressed a uniform and emphatic unwillingness to pay higher prices for lower BCFM levels. Further, each firm's representative pointed to the Enlargement Agreement, when asked if their firms would be willing to buy greater quantities of cleaner U.S. corn. The Agreement extends no variable levy relief beyond the 2-million-ton level. Quantities of corn imported beyond 2 million tons would be subject to the variable levy, thus effectively excluding corn as an economically feasible input into livestock feed and milling activities.

Conclusions

Spain's adoption of the Common Agricultural Policy upon joining the EC resulted in higher protection on imported corn. Its imports would have diminished significantly were it not for an agreement reached with the United States to maintain corn imports at the pre-accession level. Although the minimum import level specified in the agreement is offered to all exporters on a Most-Favored-Nation basis, the mechanics of the agreement currently favor imports from the United States. Consequently, the quantity and source of Spain's corn imports are less influenced by quality considerations than by the terms of the agreement.

Where quality characteristics are an important sourcing criterion, managers interviewed considered Argentine corn to be of superior quality. Six of the seven survey participants cited BCFM as an important quality characteristic when contracting for foreign corn. In comparing BCFM of U.S. and Argentine corn, managers of the two companies that clean imported corn stated that the range of BCFM in U.S. corn is wider, the variability of BCFM between shipments of U.S. corn is higher, and on average the BCFM percentage is greater in U.S. corn.

Under the current terms of the Enlargement Agreement and given existing EC grain policy, U.S. corn exporters cannot expect to increase corn exports to Spain, irrespective of any improvements in quality. If access were liberalized, or the terms of the agreement allowed corn deliveries to take place throughout the year, Argentine corn could take a larger share of Spanish imports because users perceive it to be of superior quality. If the agreement were terminated, very little corn from outside the EC would enter Spain.

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Glossary

Aflatoxin--A toxic substance produced by the soil fungus *Aspergillus flavus*, which can infect corn and other crops (such as peanuts) when they are stressed during maturation. The infection can also spread under improper storage conditions. Scientists believe aflatoxin increases the chance of developing liver cancer when ingested by humans in concentrations of more than 20 parts per billion.

Arable crops--Generally, crops that are cultivated by tilling. In the European Community, refers to those crops covered by the arable crops support regime under the CAP: grains (excluding rice), oilseeds, and protein crops.

Balanced (or complete) feed--A nutritionally adequate feed for animals other than man. A specific formula is compounded to be fed as the sole ration and is capable of maintaining life and/or promoting growth without any additional substance except water.

Breakage susceptibility--The probability that a given corn kernel will crack during handling or transportation. It has been scientifically established that breakage susceptibility differs by corn genotype.

Broken corn and foreign material--A corn grade-determining factor that includes broken corn pieces that pass through a 12/64-inch sieve plus foreign material (defined below).

Broken corn/broken kernels--All matter that passes readily through a 12/64 round-hole sieve and over a 6/64 round-hole sieve according to procedures prescribed in FGIS instructions.

Carotene--A red or orange pigment occurring in certain plants.

Common Agricultural Policy (CAP)--The unified farm policy applied by EC members. The CAP deals with agricultural policies, structural improvements to agriculture, and internal and external agricultural trade.

Compound (or formula, mixed, or manufactured) feed--A feed mixture containing two or more feed ingredients designed to satisfy the nutritional requirements of a given animal type.

Concentrate--A broad classification of feedstuffs that are high in energy and low in crude fiber content (less than 18 percent).

Contract specifications--Quality and terms of sale (i.e. c.i.f., discounts, premiums, quality specification, load rate specification, etc.).

Corn bran--The pericarp or seed coat of the corn kernel that is removed during processing and used as an animal feed.

Corn germ--The embryo found in corn kernels and frequently separated from the bran and starch endosperm during milling. This part of the kernel contains most of the oil.

Corn gluten--The tough, viscid nitrogenous substance remaining when the flour of corn is washed to remove the starch.

Corn gluten feed--A byproduct of manufacturing of starch, high-fructose corn syrup, and corn oil (wet-milling of corn). Contains all fiber originally present in corn. Corn gluten feed is a medium energy, mid-level protein meal (21-23 percent protein), which competes with wheat bran, hominy feed, and brewers' dried grain in feed rations.

Corn gluten meal--Also a byproduct of corn wet-milling process. Corn gluten meal has 60 percent protein content, competes with soybean meal and other oilseed meals.

Corn starch--A key byproduct of corn processing, it is the carbohydrate component of a corn kernel. A typical corn kernel contains 65-70 percent starch on a dry product basis. The product that results from corn wet-milling contains 99.75 percent carbohydrates and only 0.25 percent protein.

Damaged grain--In U.S. grading standards, the term damage refers primarily to biological deterioration associated with discoloration. Physical damage (such as cut or broken kernels) is not included in U.S. grades but is included in the standards of some other countries.

Defects--Computed total amount of damaged kernels, foreign material, and shrunken and broken kernels.

Dent corn--A type of corn that contains both hard and soft starch and that become indented at maturity.

Distillers' dried grain--A byproduct of the alcohol distillation process (yielding grain alcohol and ethanol). It is a feed ingredient preferred in the rations of high-producing dairy cattle, feedlot cattle, and calf starters.

Dry milling--Process for milling of grain where no water is added--produces hominy, grits, and flour/meal.

Endosperm--The middle portion of the corn kernel, consisting of two parts, the soft endosperm, opposite the tip of the kernel, and the hard endosperm, which is the interior portion of the kernel. The endosperm contains both starch and gluten. The endosperm is ground

intact in the dry-milling process but is separated into starch and gluten in the wet-milling process.

Ethanol (or ethyl alcohol)--A colorless and volatile liquid that is flammable. Ethanol is produced commercially from molasses, grain, sulfite waste liquor, or wood waste. It is derived from the industrial fermentation of simple sugars, which are the results of the hydrolyzation (by enzymes) of starch or cellulose. Ethanol for fuel in the United States is produced primarily from corn starch. In the product that is sold as fuel for automobiles, gasahol, the solution is typically 10-percent ethanol, 90-percent gasoline.

Export (or terminal) elevator--An establishment that operates facilities for receiving and shipping grains in large quantities at a terminal market. These locations were frequently the final destination of much of the grain because these were often important locations for processing, hence the designation terminal.

Export refund--Direct subsidy payment used to promote exports of agricultural goods by the European Community (EC). The payment is equal to the difference between the domestic market price and the lower price needed to export.

Feedgrains--A categorization of various grains which is intended largely for feed use. For example--corn, sorghum, barley, and oats.

Feed milling--Process of milling and mixing various feedstuffs such as corn, soybean meal, etc., producing a compound, mixed, manufactured or formula feed.

Feed wheat--Any type of low quality, low-protein wheat used as feed--generally sold at a price discount to higher protein wheats.

Flint corn--A type of corn having hard, horny, usually rounded kernels with the soft endosperm enclosed by a hard outer layer.

Foreign material--Includes dirt, pieces of cob, other grains, etc., and finely broken corn that pass through a 12/64-inch sieve, plus material on top of a 6/64-inch sieve, according to FGIS definitions.

Fractionating property:--The physical characteristics of corn that allow it to be easily broken into uniform pieces for processing.

General Agreement on Tariffs and Trade (GATT)--A multilateral agreement subscribed to by 116 governments. The primary objective of the agreement is to liberalize world trade and place it on a secure basis. The GATT also provides a framework within which international trade negotiations are conducted and trade disputes are resolved.

Grade--A number or letter designation assigned to grain based on an established set of criteria.

Grade-determining factor--Those characteristics of grain used to determine the numerical grade. The grade factor is based on quantitative limits (either maximums or minimums) placed on each factor for each grade.

Heat damage--Kernels and pieces of corn kernels that are materially discolored and damaged by heat.

Heating--A portion of a corn shipment is overmoist, and has begun deteriorating or fermenting in transit.

High-fructose corn syrup (HFCS)--HFCS is made from a dextrose (glucose) syrup, fully converted from starch hydrolyzates by means of isomerizing glucose to fructose with the use of an enzyme xylose isomerase. HFCS is used as a substitute for sugar, particularly in industrial preparation of foods and beverages.

Hominy feed--A byproduct of the corn dry-milling process. It is a preferred ingredient for dairy cattle rations. It is the equivalent of corn grain in feed value, although with higher protein and fiber content.

Hybrid corn--Hybrid corn is the product of a controlled, systematic crossing of specially selected parental strains called 'inbred lines.' Accompanying inbreeding is a rigid selection for the elimination of those inbreds carrying poor heredity and which fail to meet established standards.

Identity preservation--Segregation of a commodity from one point to the next in the marketing system. The initially identified commodity is delivered to the next point in the marketing system without being mixed with other units of the same commodity during handling and shipment.

Intrinsic quality characteristics--Characteristics of grain critical to its end use. These are nonvisual and can only be determined by analytical tests. Intrinsic characteristics of corn include starch, protein, and oil content.

Isoglucose--See *High-fructose corn syrup*.

Market channels--The agencies and institutions through which products are moved from their original producers to the final consumers in the marketing of grain. The market channel includes all stages from the point of first delivery from the farm to the final consumer of raw or processed products.

Mixed, manufactured, or formula feeds--See *Compound feeds*.

Metabolizable energy--The level of energy from a given grain that can be absorbed in an animal's digestive tract. The metabolizable energy content for a given grain or feed ingredient differs between animal types because they have different digestive processes.

Moisture content--The amount of water in grain; measured by the weight of water as a percentage of the total weight of the grain including water.

Most-Favored-Nation treatment--A commitment that a country will extend to another country the lowest tariff rates it applies to any third countries.

Nongrade determining factor--Factors that influence the quality of grain but are not taken into account in the grading of grain. These factors must be reported as information whenever an official inspection is made.

Nongrain feed ingredients--Commodities other than grains used as ingredients in mixed animal feed. These can include corn gluten feed, corn germ meal, fruit wastes, brans, distillers dried grains, sweet potatoes, and manioc.

Nonmillable material--All material that is not corn, includes shrunken and broken kernels.

Oil content--Proportion of total corn weight accounted for by oil.

Physical quality--Grain characteristics associated with the outward appearance of the grain kernel, including kernel size, shape, color, moisture, damage, and density.

Premiums--Prices that exceed the base price offered for grains with higher quality characteristics than specified. Generally calculated for factors that increase the value of the grain in market channels.

Sanitary quality--Grain characteristics associated with cleanliness. They include the presence of foreign material that detracts from the overall value and appearance of the grain, including the presence of dust, broken grain, rodent excreta, insects, residues, fungal infection, and nonmillable matter.

Screenings--The material removed from grain by means of mechanical sizing devices; generally include broken grain as well as nongrain material removed on the basis of density or particle size with mechanical cleaners.

Set-aside--Arable land that is left fallow or planted with cover crop, but is not planted to program crops.

Starch content--Proportion of total corn weight accounted for by starch.

Tender--A written offer to buy or sell goods at a specified price.

Test weight--Weight per unit volume as measured in pounds per bushel as defined in the United States. Determined by weighing the quantity of grain required to fill a 1-quart container. The international equivalent measure is kilograms per hectoliter (conversion factor 0.77).

Trade servicing--A collective term summarizing the degree of efficiency that characterizes the overall process of moving grain from exporting port to importing port, including inspection, loading, etc.

Uniformity--Conformity within and between shipments for quality attributes.

U.S.-EC Enlargement Agreement--An agreement that provides compensation to the United States for grain exports lost when Spain became a member of the EC. The agreement requires Spain to import 2.3 million tons per year of corn and other feed ingredients from non-EC sources.

U.S. No. 2 yellow corn--An official grade for yellow-kerneled corn that contains a maximum of 3 percent broken corn and foreign material, 0.2 percent heat-damaged kernels, 5 percent total damaged kernels, and has a minimum test weight of 54 pounds per bushel.

U.S. No. 3 yellow corn--An official grade for yellow-kerneled corn that contains a maximum of 4 percent broken corn and foreign material, 0.5 percent heat-damaged kernels, 7 percent total damaged kernels, and has a minimum test weight of 52 pounds per bushel.

Variable levy--An import tax that varies in order to assure that the import price, after payment of the levy, will equal a predetermined minimum import price.

Wet milling--Process for milling of grain where water is added--produces starch, corn syrup, and HFCS.

White corn--A type of corn, lacking the carotene (yellowish) content of corn, used mostly for human consumption. White corn makes up only a small part of global corn production and trade.

Yellow corn--The most common type of corn produced, used largely as a feedgrain but also as a foodstuff in large parts of Sub-Saharan Africa and Latin America.

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U.S. Department of Agriculture
Economic Research Service
1301 New York Avenue, NW.
Washington, DC 20005-4788