

## **Chapter 1**

# **The Argentine Grain System**

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# Chapter 1

## The Argentine Grain System

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Argentina competes with the United States in many of the same world markets for corn, wheat, and soybeans. The country is a major producer of feedgrains and oilseeds as well as a large consumer of these grains and processed products. The relative position of Argentina in international markets has changed over the past 20 years, as has that of the United States. In general these changes have resulted in a weakening of the U.S. position. \*

\*This chapter draws on the OTA paper "A Comparison of Quality Factors of the Argentine and United States Grain Systems," based on findings of an OTA study team consisting of Dr. Lowell D. Hill, Mr. Thomas E. Weidner, Mr. Robert A. Zortman, Dr. Michael J. Phillips, and Dr. James G. McGrann (interpreter) that traveled to Argentina in 1987. Dr. Hill integrated the findings of the team into the OTA paper.

Argentina is the only major competitor of the United States in exports of corn, wheat, and soybeans. Most other countries compete with the United States in only one grain, i.e., Brazil—soybeans, Canada—wheat. Argentina has along history in producing and exporting corn and wheat that began at the turn of this century and has been a significant exporter of soybeans since the late 1970s.

Corn, wheat, and soybeans are grown in the rich, dark soils located in the eastern part of the country (figure 1-1). The provinces of Buenos Aires, Santa Fe, and Cordoba are the main grain production areas.

### OVERVIEW OF GRAIN PRODUCTION AND MARKETS

#### Corn

Corn production in Argentina is concentrated in a relatively small proportion of the total geographical area because of climate, topography, and soil conditions. The Corn Belt consists of five provinces: Buenos Aires, Santa Fe, Cordoba, La Pampa, and Entre Rios (figure 1-1). Most of the corn, however, is produced in the Buenos Aires and Santa Fe provinces.

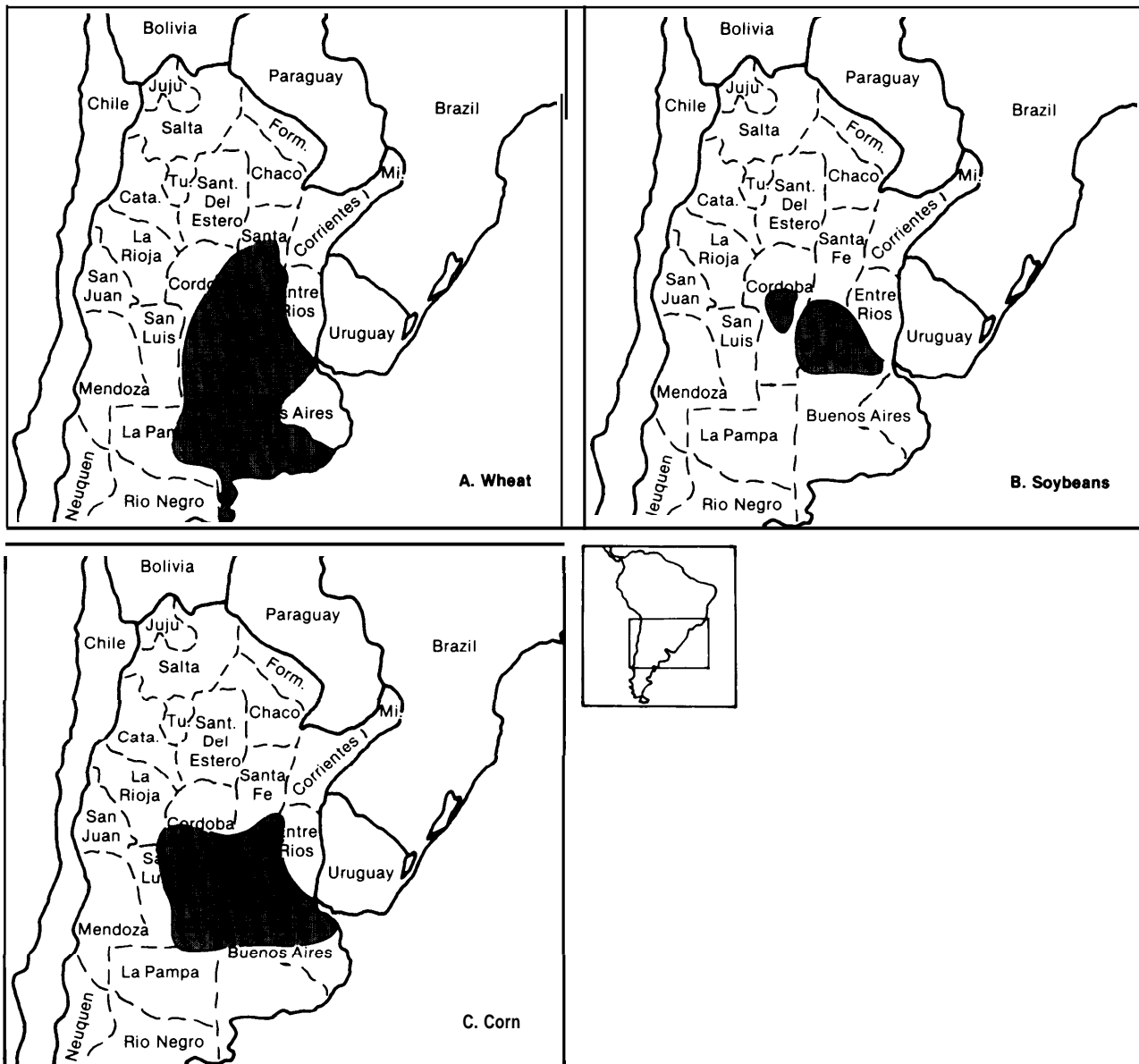
Argentina has had no significant trends in production of corn but has experienced wide annual fluctuations due to weather. A record 9.92 million metric tons (MMT) in 1970 was followed by a 5.85 MMT crop in 1971 (table 1-1). With such wide swings in production, exports as a percent of total usage also varied, from 34 percent in 1971 to 71 percent in 1980. Domestic feed use shows a steady increase. Industrial use of corn in Argentina (domestic other in table 1-1) grew from 0.5 MMT in 1964 to 1.7 MMT in 1973, and then declined to 0.9 MMT in 1986. The primary user is the wet-milling industry.

World market shares show the United States gaining relative to Argentina during the 1970s. The two exporters share the same trading partners, especially Western Europe, the U. S. S. R., and Mexico. Following the crop year of 1980/81, the United States lost market share relative to other exporting nations. Argentina continued to keep approximately 9 percent of the world market (figure 1-2).

The destination of Argentine corn exports has shifted over time in response to economic incentives and Government policies affecting international trade. In 1973/74, Italy and Spain received two-thirds of the maize exported from Argentina (table 1-2). The Netherlands, the United Kingdom, China, and the U.S.S.R. were also important destinations then, albeit at considerably lower levels.

Major shifts in destinations occurred **between 1973/74 and 1974/75**. The percentage going to the U.S.S.R. increased, Mexico entered the market, and China purchased 473,000 tons of Argentine grain. Over the next 2 years the share

Figure 1-1.—Growing Regions of Argentina: Wheat, Soybeans, Corn



● Each dot represents 500,000 metric tons.

SOURCE: Adapted from U.S. Department of Agriculture, *Major World Crop Areas and Climatic Profiles*, Agriculture Handbook 884, 1987

going to the U. S. S. R., Mexico, and China dropped, while Spain increased its share, receiving more than one-fourth of Argentina's maize exports in 1976/77.

From 1974/75 to 1979/80 there was a general downturn in the share of Argentine maize delivered to Mexico, Spain, and Italy. The Italian preference for Argentine La Plata maize ap-

peared to be weakening throughout this period, as evidenced by their declining share. The major exception was in 1975/76, when Italy maintained purchases of 1.5 MMT in the face of a major decline in Argentine exports. In contrast, the U.S.S.R. share grew erratically, fluctuating from a low of 4 percent in 1976/77 to 61 percent in 1979/80. The rapid growth of the Soviet share in the late 1970s prepared the stage

**Table 1-1.—Production and Utilization of Corn in Argentina, 1964.88** (in 1,000 MT)<sup>a</sup>

| Local marketing year | Area harvested (1,000 ha) | Yield (MT/ha) | Production | Beginning stocks | Imports (1,000 MT) | Total supply | Exports | Domestic feed | Domestic other | Total usage | Ending stocks |
|----------------------|---------------------------|---------------|------------|------------------|--------------------|--------------|---------|---------------|----------------|-------------|---------------|
| 1965/66 . . . . .    | 3,062                     | 16.8          | 5,144      | 24               | 0                  | 5,168        | 2,707   | 1,931         | 501            | 5,139       | 29            |
| 1966/67 . . . . .    | 3,274                     | 21.5          | 7,039      | 29               | 1                  | 7,069        | 4,010   | 2,559         | 483            | 7,052       | 17            |
| 1967/68 . . . . .    | 3,450                     | 23.2          | 8,004      | 17               | 0                  | 8,021        | 4,153   | 3,270         | 558            | 7,981       | 40            |
| 1968/69 . . . . .    | 3,378                     | 19.4          | 6,553      | 40               | 1                  | 6,595        | 3,448   | 2,466         | 668            | 6,582       | 13            |
| 1969/70 . . . . .    | 3,556                     | 19.3          | 6,863      | 13               | 0                  | 6,876        | 3,740   | 2,381         | 743            | 6,864       | 12            |
| 1970/71 . . . . .    | 4,017                     | 23.3          | 9,360      | 12               | 0                  | 9,371        | 5,510   | 2,957         | 883            | 9,350       | 21            |
| 1971/72 . . . . .    | 4,066                     | 24.4          | 9,921      | 21               | 1                  | 9,943        | 6,436   | 2,285         | 532            | 9,253       | 690           |
| 1972/73 . . . . .    | 3,147                     | 18.6          | 5,853      | 690              | 1                  | 6,545        | 2,040   | 3,594         | 387            | 6,021       | 524           |
| 1973/74 . . . . .    | 3,565                     | 25.2          | 8,984      | 524              | 0                  | 9,508        | 5,066   | 2,781         | 1,111          | 8,958       | 550           |
| 1974/75 . . . . .    | 3,486                     | 28.4          | 9,900      | 550              | 0                  | 10,450       | 5,399   | 2,954         | 1,661          | 10,014      | 436           |
| 1975/76 . . . . .    | 3,070                     | 24.1          | 7,399      | 436              | 0                  | 7,834        | 3,517   | 2,477         | 1,420          | 7,414       | 420           |
| 1976/77 . . . . .    | 2,766                     | 21.1          | 5,836      | 761              | 0                  | 6,597        | 3,238   | 2,563         | 281            | 6,082       | 515           |
| 1977/78 . . . . .    | 2,532                     | 32.8          | 8,305      | 515              | 0                  | 8,820        | 5,231   | 3,101         | 305            | 8,637       | 183           |
| 1978/79 . . . . .    | 2,660                     | 36.5          | 9,709      | 183              | 0                  | 9,892        | 5,916   | 3,250         | 292            | 9,458       | 434           |
| 1979/80 . . . . .    | 2,899                     | 31.0          | 8,987      | 434              | 0                  | 9,421        | 5,965   | 3,050         | 233            | 9,248       | 173           |
| 1980/81 . . . . .    | 2,490                     | 25.7          | 6,399      | 173              | 0                  | 6,572        | 3,417   | 2,800         | 247            | 6,464       | 108           |
| 1981/82 . . . . .    | 3,394                     | 38.0          | 12,897     | 108              | 0                  | 13,005       | 9,098   | 3,400         | 297            | 12,795      | 210           |
| 1982/83 . . . . .    | 3,170                     | 30.3          | 9,605      | 210              | 0                  | 9,815        | 5,765   | 3,200         | 305            | 9,270       | 545           |
| 1983/84 . . . . .    | 2,970                     | 30.3          | 8,999      | 545              | 0                  | 9,544        | 6,056   | 2,900         | 299            | 9,255       | 289           |
| 1984/85 . . . . .    | 3,025                     | 30.4          | 9,196      | 289              | 0                  | 9,485        | 5,448   | 3,650         | 296            | 9,394       | 91            |
| 1985/86 . . . . .    | 3,350                     | 34.3          | 11,491     | 91               | 0                  | 11,582       | 7,126   | 3,475         | 591            | 11,192      | 390           |
| 1986/87 . . . . .    | 3,351                     | 37.0          | 12,400     | 390              | 0                  | 12,790       | 7,367   | 4,300         | 300            | 11,967      | 823           |
| 1987/88 . . . . .    | 2,900                     | 31.9          | 9,250      | 823              | 0                  | 10,073       | 4,000   | 3,700         | 900            | 8,600       | 1,473         |

SOURCE U S Department of Agriculture, Foreign Agriculture Service, *Foreign Agriculture Circular—Grains/Wold Grain Situation and Outlook*, Washington, DC, various issues Reference tables for Wheat, Corn, and Total Coarse grains.

**Table 1-2.—Major Destinations of Argentine Corn Exports, 1975/76-85** (in 1,000 MT/percent of total in parentheses)

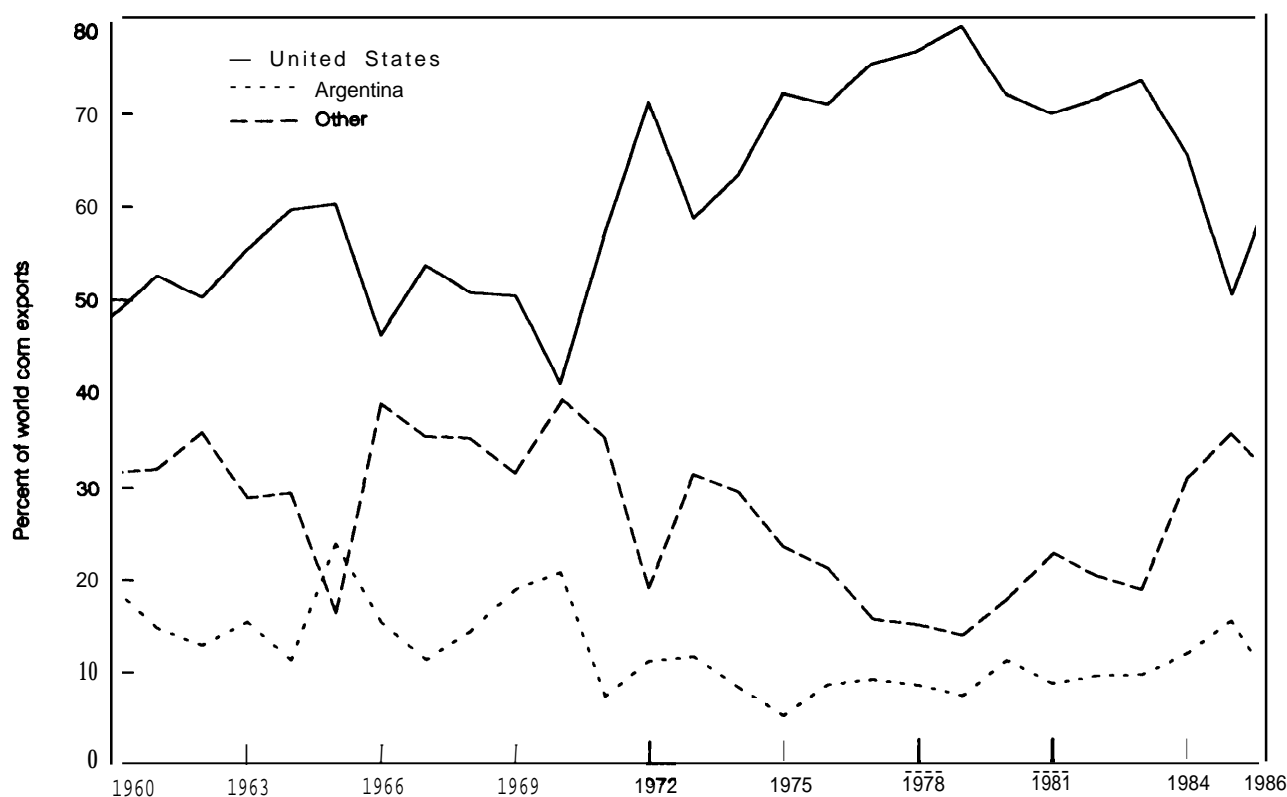
| Year                        | Italy   | Spain  | U.S.S.R. | Netherlands | United Kingdom | Mexico   | China | Total Argentine exports |
|-----------------------------|---------|--------|----------|-------------|----------------|----------|-------|-------------------------|
| 1973/74 . . . . .           | 2,772   | 600    | 246      | 115         | 120            |          | 252   | 5,111                   |
|                             | (54.2)  | (11.7) | (4.8)    | (2.3)       | (2.30)         | (0.02)   | (4.9) |                         |
| 1974/75 . . . . .           | 2,056   | 556    | 1,148    |             |                | 723      | 473   | 5,831                   |
|                             | (35.3)  | (9.5)  | (19.7)   | (1.0)       | (0.09)         | (12.40)  | (8.1) |                         |
| 1975/76 . . . . .           | 1,520   | 225    | 213      |             |                | 289      | —     | 2,595                   |
|                             | (58.6)  | (8.7)  | (8.2)    | (2.6)       | (.041)         | (1 1.10) | (0)   |                         |
| 1976/77 . . . . .           | 1,893   | 1,109  | 184      | 126         | 133            |          | —     | 4,384                   |
|                             | (43.2)  | (25.3) | (4.2)    | (2.9)       | (3.00)         | (0.60)   | (0)   |                         |
| 1977/78 . . . . .           | 1,381   | 1,069  | 1,608    | 142         |                |          | 59    | 5,997                   |
|                             | (23.0)  | (17.8) | (26.8)   | (2.4)       | (1.60)         | (0.80)   | (1.0) |                         |
| 1978/79 . . . . .           | 1,838   | 1,573  | 1,387    | 147         | 53             |          | 131   | 6,664                   |
|                             | (27.6)  | (23.6) | (20.8)   | (2.2)       | (.80)          | (0.30)   | (2.0) |                         |
| 1979/80 . . . . .           | 709     | 314    | 2,461    |             | 21             | —        | —     | 4,060                   |
|                             | (1 7.5) | (7.7)  | (60.6)   | (1.4)       | (.51)          | (0)      | (0)   |                         |
| 1980 <sup>1</sup> . . . . . | 328     |        | 2,965    |             | —              | —        | —     | 3,525                   |
|                             | (9.3)   | (0.4)  | (84.1)   | (2.10)      | (0)            | (0)      | (0)   |                         |
| 1981 . . . . .              | 300     | 225    | 7,989    |             | —              | —        | —     | 9,112                   |
|                             | (3.3)   | (2.5)  | (87.7)   | (1.1)       | (0)            | (0)      | (0)   |                         |
| 1982 . . . . .              |         |        | 3,301    |             | —              | —        | 132   | 5,214                   |
|                             | (4.4)   | (7.6)  | (63.3)   | (1.8)       | (0)            | (0)      | (2.5) |                         |
| 1983 . . . . .              | 395     | 697    | 2,002    | 102         | —              | —        | 49    | 6,477                   |
|                             | (6.1)   | (10.8) | (30.9)   | (1.6)       | (0)            | (0)      | (0.8) |                         |
| 1984 . . . . .              | 335     |        | 1,090    |             | —              | —        | —     | 5,558                   |
|                             | (6.0)   | (10.6) | (19.6)   | (1.1)       | (0)            | (0)      | (0)   |                         |
| 1985 . . . . .              | 502     | 956.4  | 2,038.7  | 107.4       | —              | 197.4    | —     | 3,238.2                 |
|                             | (7.1)   | (13.6) | (29.0)   | (1.5)       | (0)            | (2.7)    | (0)   | 7,040.8                 |

Dashes volume less than 1,000 MT.

<sup>1</sup>1980-85 reporting period has been shifted to a calendar Year

SOURCE: 1973/74-1979/80 data from U.S. Department of Agriculture, Foreign Agriculture Service, *Grain Exports by Selected Reporters*, Foreign Agriculture Circulars, 1978 and 1982, Washington, DC Data for 1980-85 are from Secretary of State, Agriculture, Livestock and Fishery, unpublished data, 1985, Buenos Aires, Estimates vary by source So do the time periods used for crop years, marketing years, and calendar years, No consistent sources were found that covered the entire period

Figure 1-2.-World Corn Exporters' Market Shares (includes Intro EC and bloc trade)



SOURCE: U.S. Department of Agriculture, Foreign Agriculture Service, Foreign Agriculture Circulars, various issues

for the near Soviet dominance of Argentine exports in the early 1980s.

In late 1980 and early 1981, political events dramatically altered the destinations of Argentine maize exports. After the 1980 invasion of Afghanistan by the U. S. S. R., the United States suspended U.S. grain sales to that country. Consequently, Argentine shipments to the U.S.S.R. increased to 84 percent of the exports in 1980/81 and then 88 percent in 1981/82.

Shipments to the United Kingdom had been generally declining since 1973/74 and dropped to zero in calendar year 1980 as a result of the price premium being paid by the U. S. S. R., but the Falkland Islands incident, starting April 2, 1982, resulted in a "total ban on imports from Argentina" on April 10, 1982, and the UK share of Argentine maize exports remained at zero through 1985.

Shipments to Spain and Italy continued to drop, with especially dramatic decreases in **1980** and **1981** as price premiums offered by the U.S.S.R. directed the export flow away from Western Europe. Resumption of normal grain trade between the United States and U.S.S.R. reduced Argentine exports to the U.S.S.R. in **1982**, **1983**, and **1984**, but price relationships shifted the flow back in **1985**. Spain and Italy also regained some of their relative importance in 1985.

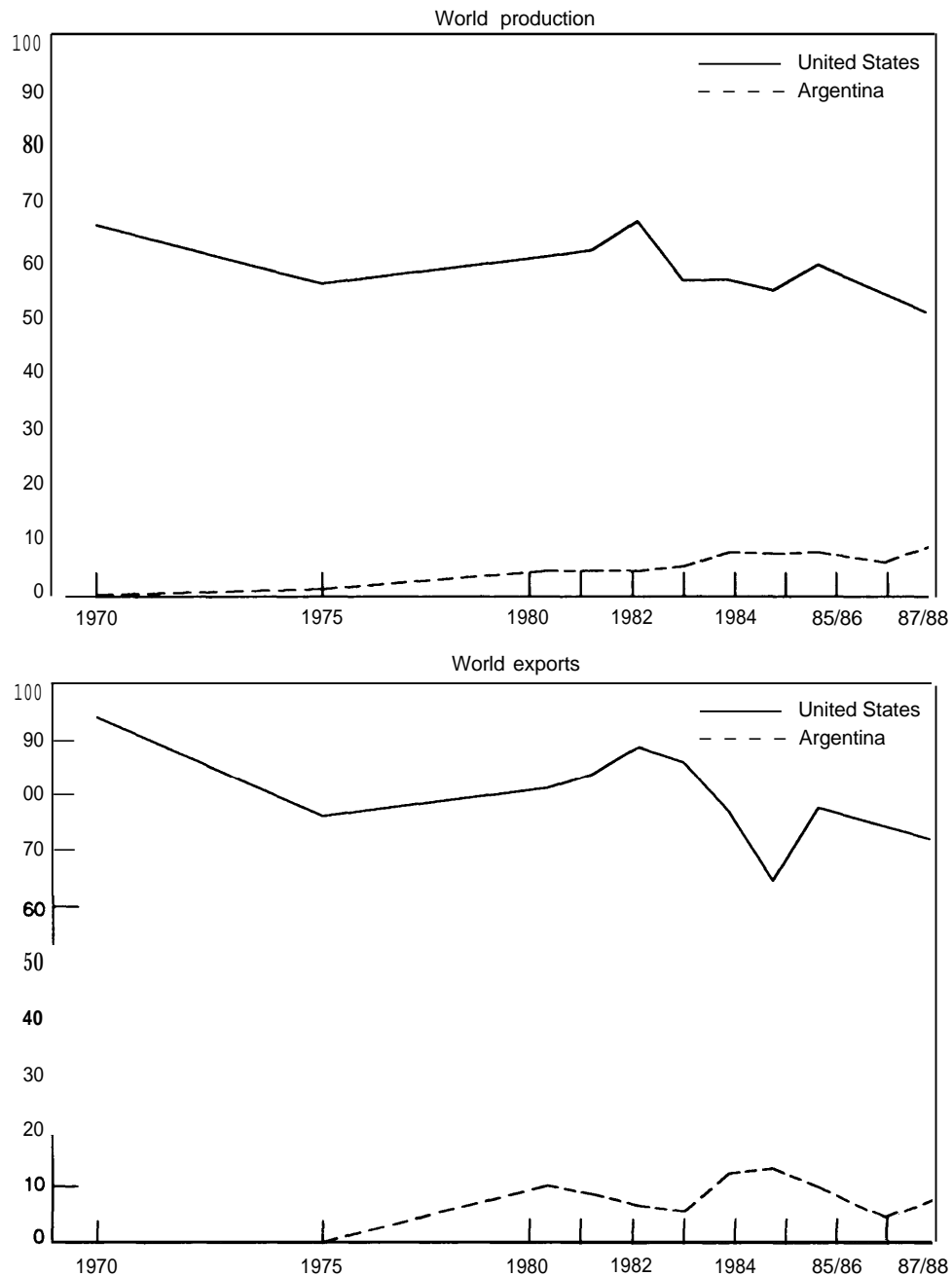
### Soybeans and Soybean Meal

Soybean production is more concentrated geographically in Argentina than corn production. It is produced mainly in three provinces: Buenos Aires, Cordoba, and Santa Fe (figure 1-1). The Santa Fe region is the largest producer of soybeans producing twice the amount of either Buenos Aires or Cordoba.

The United States dominates world production of raw soybeans, accounting for about 60 percent of total world production while Argentina produces about 7.5 percent (figure 1-3). The

United States and Argentina have increased the production of soybeans significantly since the

**Figure 1-3. -U.S. and Argentina Production and Export of Soybeans  
As a Share of World Totals (percentage)**



SOURCE: 1985-84: Food and Agriculture Organization, *Production Yearbook* and *FAO Trade Yearbook*, various years; 1984/85-87/88: U.S. Department of Agriculture, Foreign Agriculture Service, *World Oilseed Situation and Market Highlights*, Circular Series FOP 9-88, September 1988.

mid-1960s. U.S. production sprang from 19 MMT in 1964 to 55 MMT in 1986, an increase of 287 percent in 23 years. During this same period, Argentina registered a 453-fold increase, from 17,000 MT to 7.7 MMT.

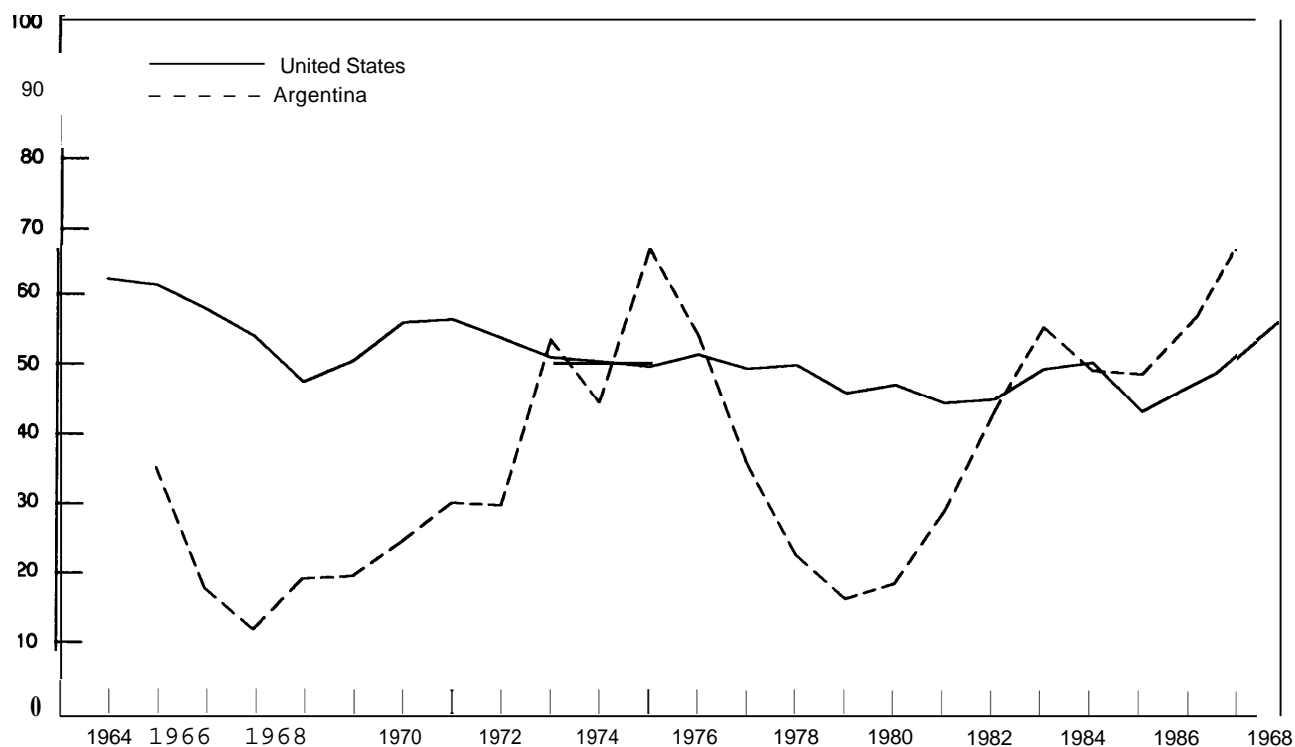
Export of soybeans followed a different pattern than production. Argentina reported no exports through 1975, but the volume increased rapidly over the next 4 years and then stabilized at about 2 to 3 MMT. U.S. exports of soybeans increased steadily through 1981.

In both countries, the percent of supply processed annually followed a similar pattern up through 1971, with total crush ranging from 12 to 35 percent in Argentina and from 48 to 62 percent in the United States (figure 1-4). But unlike the United States, Argentina exports a high proportion of its meal and oil—93 and 87 percent, respectively (table 1-3). U.S. exports

represent 23 and 10 percent of its meal and oil. Argentine meal exports increased rapidly between 1965 and 1984, capturing 12.7 percent of the world market (figure 1-5). Their share has been relatively stable since 1984.

The destinations of soybean and soybean meal exports reveal U.S.-Argentine competition (table 1-4). Western Europe has been a major market for raw beans for both countries, receiving 45 percent of U.S. exports in 1985/86 and 60 percent of Argentina's. Argentina has larger and more stable flows to the U.S.S.R. Japan accounts for a very small and intermittent proportion of Argentine exports but is a large and stable customer for U.S. soybeans. In the case of soybean meal, Western Europe provides the largest market for both exporters, causing direct and vigorous competition. East European countries are of almost no importance as a destination for U.S. or Argentine exports.

**Figure 1-4.-Volume of Soybeans Processed As a Percent of Total Domestic Supplies:  
United States and Argentina**



SOURCE: Calculated from U.S. Department of Agriculture, Foreign Agriculture Service, *Foreign Agriculture Circular—Oilseeds and Products/World Oilseed Situation and Market Highlights*, various issues.



Table 1-3.—U.S. and Argentine Exports of Soybeans as a Share of Respective Domestic Supplies, 1965/87

| Marketing year          | Percent of usage<br>exported as soybeans |               | Percent of meal<br>usage exported |               | Percent of oil<br>usage exported |               |
|-------------------------|--|---------------|-----------------------------------|---------------|----------------------------------|---------------|
|                         | Argentina                                | United States | Argentina                         | United States | Argentina                        | United States |
| 1965 .....              | 0%                                       | 290/0         | 00/0                              | 180/0         | 0%                               | 250/0         |
| 1966 .....              | 0  | 30            | 0                                 | 20            | 0                                | 16            |
| 1967 .....              | 0  | 30            | 0                                 | 20            | 0                                | 18            |
| 1968 .....              | 0  | 30            | 0                                 | 21            | 0                                | 16            |
| 1969 .....              | 0  | 30            | 0                                 | 21            | 0                                | 13            |
| 1970 .....              | 0  | 35            | 0                                 | 23            | 0                                | 18            |
| 1971 .....              | 0  | 34            | 0                                 | 25            | 0                                | 22            |
| 1972 .....              | 0  | 35            | 0                                 | 22            | 0                                | 18            |
| 1973 .....              | 0  | 37            | 9                                 | 28            | 81                               | 14            |
| 1974 .....              | 0  | 38            | 6                                 | 29            | 70                               | 16            |
| 1975 .....              | 0  | 35            | 37                                | 26            | 23                               | 14            |
| 1976 .....              | 16                                       | 37            | 66                                | 25            | 79                               | 11            |
| 1977 .....              | 46                                       | 39            | 70                                | 24            | 66                               | 17            |
| 1978 .....              | 69                                       | 41            | 70                                | 27            | 53                               | 20            |
| 1979 .....              | 77                                       | 40            | 52                                | 27            | 96                               | 21            |
| 1980 .....              | 75                                       | 42            | 50                                | 29            | 78                               | 23            |
| 1981 .....              | 63                                       | 39            | 71                                | 28            | 45                               | 15            |
| 1982 .....              | 50                                       | 45            | 92                                | 28            | 73                               | 18            |
| 1983 .....              | 34                                       | 43            | 94                                | 27            | 80                               | 17            |
| 1984 .....              | 44                                       | 41            | 93                                | 23            | 97                               | 16            |
| 1985 .....              | 44                                       | 35            | 92                                | 20            | 92                               | 14            |
| 1986 .....              | 35                                       | 39            | 95                                | 24            | 89                               | 11            |
| 1987 <sup>a</sup> ..... | 19                                       | 39            | 92                                | 23            | 94                               | 10            |

<sup>a</sup>Preliminary.SOURCE: U.S. Department of Agriculture, Foreign Agriculture Service, *Foreign Agriculture Circular—Oilseeds and Products/World Oilseed Situation and Market Highlights*. Washington, DC, various issues. Reference tables on the major producers and consumers of soybeans and soybean products.

Table 1-4.—Major Destinations of Argentine Soybean Exports 1975/76-85/86a

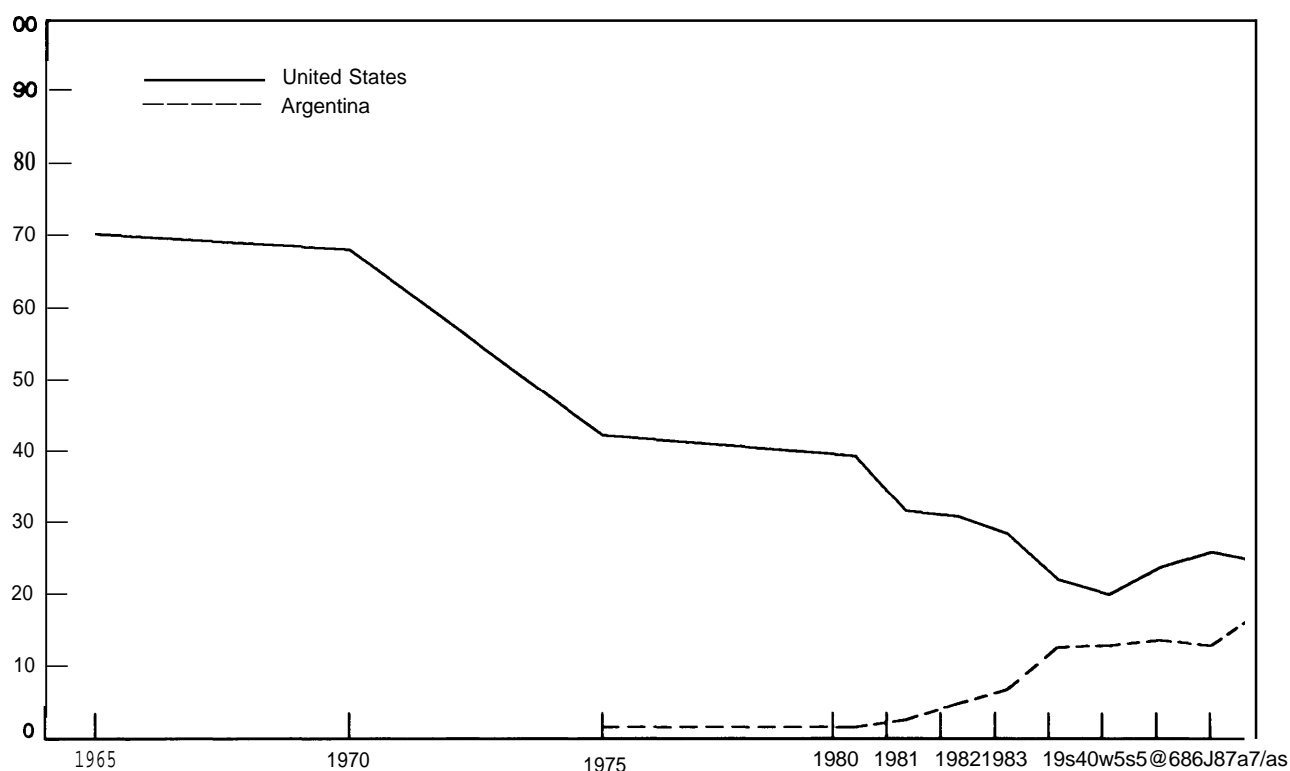
(in 1,000 MT/percent of total in parentheses)

| Destination year | Western Europe  | Japan       | China        | U.S.S.R.      | Mexico        | Brazil        | Others <sup>b</sup> | Total |
|------------------|-----------------|-------------|--------------|---------------|---------------|---------------|---------------------|-------|
| 1976/77 .....    | 111<br>(100.0)  | n.a.        | n.a.         | —<br>(0)      | n.a.          | n.a.          | (0)                 | 111   |
| 1977/78 .....    | (77.7)          | n.a.        | n.a.         | (0)           | n.a.          | n.a.          | 139<br>(22.3)       | 623   |
| 1978/79 .....    | 1,534<br>(77.9) | n.a.        | n.a.         | (1.17)        | n.a.          | n.a.          | 402<br>(20.4)       | 1,969 |
| 1979 .....       | 2,463<br>(87.7) | 14<br>(0.5) | 102<br>(3.6) | (0)           | (0.6)         | (2.2)         | 150<br>(5.3)        | 2,810 |
| 1980 .....       | 1,608<br>(59.3) | 16<br>(0.6) | —<br>(0)     | 747<br>(27.6) | (0)           | 247<br>(91)   | (3.4)               | 2,709 |
| 1981 .....       | 782<br>(35.4)   | 22<br>(1.0) | 81<br>(3.7)  | 717<br>(32.5) | 274<br>(12.4) | 266<br>(121)  | (2.9)               | 2,207 |
| 1982 .....       | 488<br>(25.4)   | —<br>(0)    | 53<br>(2.8)  | 716<br>(37.2) | 122<br>(6.3)  | 515<br>(26.8) | (1.15)              | 1,923 |
| 1983 .....       | 729<br>(51.4)   | —<br>(0)    | —<br>(0)     | 636<br>(44.8) | (0)           | (0)           | (3.8)               | 1,419 |
| 1984 .....       | 2,297<br>(741)  | —<br>(0)    | —<br>(0)     | 149<br>(4.8)  | 105<br>(3.4)  | 157<br>(5.1)  | 392<br>(12.6)       | 3,100 |
| 1985 .....       | 1,779<br>(59.5) | 32<br>(n)   | —<br>(0)     | 454<br>(15.2) | 297<br>(99)   | (0)           | 425<br>(14.2)       | 2,987 |

<sup>a</sup>Argentine marketing year for soybeans is April-March.<sup>b</sup>Incl. "n.a."<sup>c</sup>1975/76 "exports" were less than 1,000 MT. No single data available.

SOURCES: 1976/77-78/79: JNG. Anuario 1961. 1979-85: Bolsa de Cereales de B.A. Numero Estadístico 1966.

Figure 1-5.-Market Shares of World Soybean Meal<sup>a</sup> Exports: United States and Argentina (in percent)



<sup>a</sup> During the period 1965-85, this data includes soybean cake and meal

SOURCE: 1985-84: Food and Agriculture Organization, *FAO Trade Yearbook*, various years; 198485-87/88: U.S. Department of Agriculture, Foreign Agriculture Service, *World Oilseed Situation and Market Highlights*, Circular Series FOP 9-88, September 1988.

## Wheat

As with corn and soybean production wheat production is concentrated in a relatively small geographical area. It is concentrated in four provinces: Buenos Aires, La Pampa, Cordoba and Santa Fe (figure 1-1). Most wheat is produced in the Buenos Aires Province.

Wheat production in Argentina has been small compared with production in the United States, but the rate of increase between 1970 and 1986 has been much greater. Production has ranged from a low of 5 MMT in 1970 to a high of 15 MMT in 1982 (table 1-5). Because of this extreme variability in production, Argentina has frequently been an importer as well as an exporter of wheat. Exports have also been quite variable (table 1-5), and in 3 years since 1981 have exceeded 7 MMT. The country's share of world wheat exports has ranged from 2.6 to 9.2 percent since 1970, with a recent drop

following earlier increases (figure 1-6). The U.S. share during that period declined to less than one-third by 1986/87, with mid-1980's fluctuations.

The destinations of U.S. and Argentine wheat exports show a degree of market segmentation rather than direct competition (table 1-6). Japan is a major customer for U.S. wheat exports, taking as much as 12.4 percent, but is only included in "others" for Argentina. The U.S.S.R. has recently been receiving 39 to 81 percent of Argentine exports, while it generally receives less than 10 percent of U.S. exports. Only in Brazil's purchases is there evidence of strong competition, with both Argentina and the United States exporting 2 to 10 percent of their production to Brazil during the 1980s. Argentina's loss of the European market reflects increased wheat production in Western Europe but may also relate to the shift to a low-protein

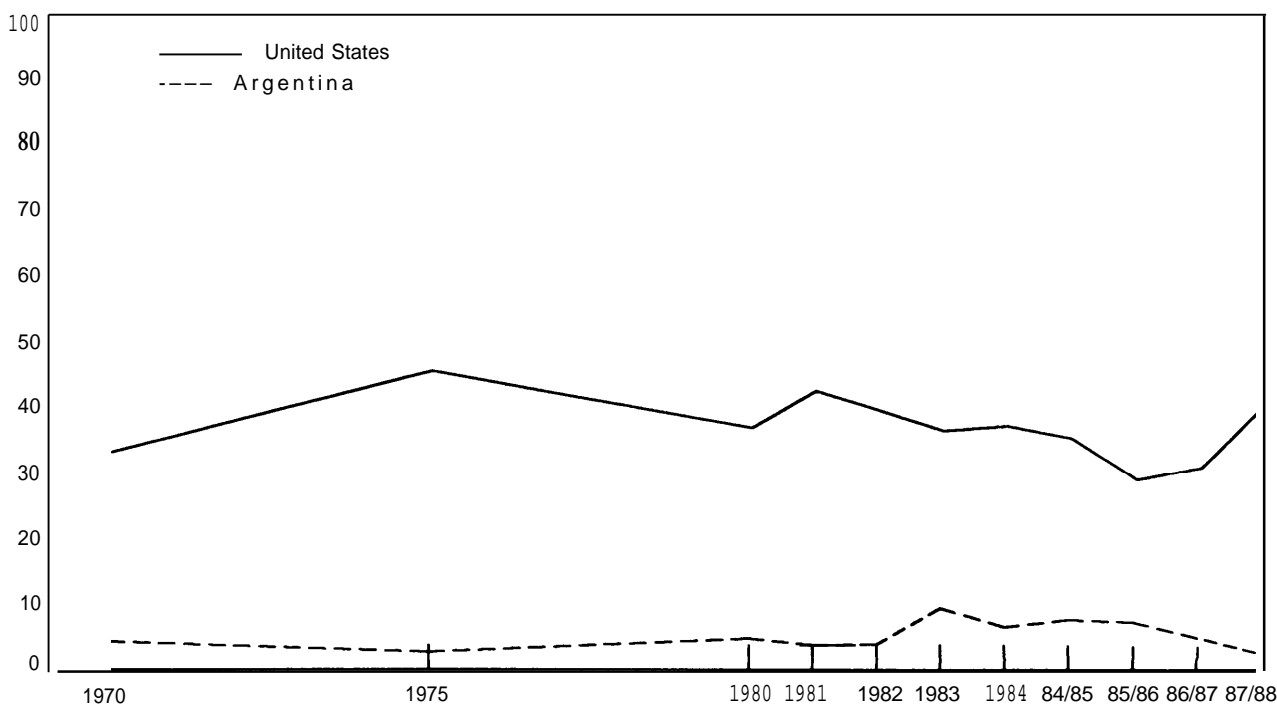
**Table 1-5.—U.S. and Argentine Production and Export of Wheat, 1970-87** (in MMT/percent of total)

| Year                    | United States |        |         | Argentina  |        |         |
|-------------------------|---------------|--------|---------|------------|--------|---------|
|                         | Production    | Export | Percent | Production | Export | Percent |
| 1970 .....              | 36.8          | 19.8   | (54)    | 4.9        | 1.0    | (20)    |
| 1971 .....              | 44.0          | 16.3   | (37)    | 5.7        | 1.6    | (28)    |
| 1972 .....              | 42.1          | 30.4   | (72)    | 6.9        | 3.2    | (46)    |
| 1973 .....              | 46.5          | 32.9   | (71)    | 6.6        | 1.6    | (24)    |
| 1974 .....              | 48.8          | 27.4   | (56)    | 6.0        | 1.8    | (30)    |
| 1975 .....              | 57.9          | 31.9   | (55)    | 8.6        | 3.2    | (37)    |
| 1976 .....              | 58.5          | 25.9   | (44)    | 10.9       | 5.9    | (54)    |
| 1977 .....              | 55.6          | 30.6   | (55)    | 5.7        | 1.8    | (32)    |
| 1978 .....              | 48.2          | 32.5   | (67)    | 8.1        | 4.1    | (51)    |
| 1979 .....              | 58.1          | 37.4   | (64)    | 8.1        | 4.8    | (59)    |
| 1980 .....              | 64.6          | 41.2   | (64)    | 7.8        | 3.8    | (49)    |
| 1981 .....              | 75.7          | 48.2   | (64)    | 8.2        | 3.6    | (44)    |
| 1982 .....              | 75.4          | 41.1   | (55)    | 15.0       | 9.9    | (66)    |
| 1983 .....              | 65.8          | 38.9   | (59)    | 12.7       | 7.8    | (61)    |
| 1984 .....              | 70.7          | 38.8   | (55)    | 13.2       | 9.4    | (71)    |
| 1985 .....              | 66.0          | 24.9   | (38)    | 8.5        | 4.3    | (51)    |
| 1986 .....              | 56.9          | 28.4   | (50)    | 8.9        | 4.3    | (48)    |
| 1987 <sup>b</sup> ..... | 57.3          | 38.5   | (67)    | 9.1        | 5.6    | (62)    |

<sup>a</sup>Numbers in parentheses denote the percentage of production used for exports.

<sup>b</sup>Preliminary.

SOURCES: Calculated from U.S. Department of Agriculture, Foreign Agriculture Circular-Grains/World Grain Situation and Outlook, Washington, DC, various issues.

**Figure 14.—Market Shares of World Wheat<sup>a</sup> Exports, United States and Argentina (In percent)**

<sup>a</sup> 1970-84 Wheat and Wheat Flour, in Wheat equivalent

SOURCE: 1970-84: Food and Agriculture Organization, *FAO Production Yearbook*, various years; *FAO Trade Yearbook*, various years. 1984/85-87/88: U.S. Department of Agriculture, Foreign Agriculture Service, *World Grain Situation and Outlook*, Circular Series FOP 10-88, October 1988.

**Table 1-6.—Major Destinations of Argentine Wheat Exports, 1975/76-85/86<sup>a</sup>**  
(in 1,000 MT/percent of total in parentheses)

| Year            | U.S.S.R.        | China           | Western Europe | Brazil          | Bolivia      | Peru         | Iran            | Others <sup>b</sup> | Total  |
|-----------------|-----------------|-----------------|----------------|-----------------|--------------|--------------|-----------------|---------------------|--------|
| 1975/76 . . . . | 940<br>(32.2)   | N/A             | 299<br>(10.3)  | (23.6)          | (1.1)        | 181<br>(6.2) | N/A             | 779<br>(26.7)       | 2,923  |
| 1976/77 . . . . | 100<br>(1.8)    | N/A             | 438<br>(08.0)  | 933<br>(17.1)   | (0.9)        | 282<br>(5.2) | N/A             | 3,644<br>(66.9)     | 5,448  |
| 1977/78 . . . . | 1,123<br>(74.2) | N/A             | (1.8)          | (1.8)           | (2.9)        | (71)         | N/A             | 166<br>(11.1)       | 1,493  |
| 1978/79 . . . . | 109<br>(2.8)    | N/A             | 141<br>(3.7)   | 1,377<br>(35.7) | (1.6)        | 303<br>(7.9) | N/A             | 1,862<br>(48.3)     | 3,855  |
| 1979 . . . . .  | 238<br>(5.7)    | 885<br>(21.3)   | 202<br>(4.9)   | 1,494<br>(36.0) | (1.4)        | 353<br>(8.5) | (0)             | 918<br>(22.1)       | 4,149  |
| 1980 . . . . .  | 2,272<br>(51.9) | 665<br>(15.2)   | (0)            | 853<br>(19.5)   | (4.8)        | 162<br>(3.7) | (2.9)           | 126<br>(2.9)        | 4,375  |
| 1981 . . . . .  | 2,954<br>(80.7) | 126<br>(3.5)    | (1.6)          | (1.4)           | (5.0)        | -            | -               | 287<br>(7.8)        | 3,660  |
| 1982 . . . . .  | 2,742<br>(71.9) | (2.5)           | (0.4)          | 258<br>(6.8)    | (2.7)        | -            | (2.4)           | 512<br>(13.4)       | 3,811  |
| 1983 . . . . .  | 4,981<br>(49.0) | 2,946<br>(29.0) | (0.5)          | (0)             | (0.7)        | 193<br>(1.9) | 1,012<br>(10.0) | (8.9)               | 10,165 |
| 1984 . . . . .  | 2,853<br>(392)  | (0)             | 202<br>(2.8)   | 200<br>(2.8)    | 158<br>(2.2) | (4.7)        | 1,200<br>(16.5) | 2,313<br>(31.8)     | 7,269  |
| 1985 . . . . .  | 4,613<br>(48.0) | 877<br>(9.1)    | (n)            | (8.8)           | (0.9)        | (6.9)        | 548<br>(5.7)    | 1,866<br>(19.4)     | 9,604  |

<sup>a</sup>Argentine marketing year for wheat is December-November; Bread Wheat.

<sup>b</sup>Including N/A.

SOURCES: 1975/76-78/79: JNG Anuario 1981. 1979-85: Bolsa de Cereales de Buenos Aires.

spring wheat in Argentina's production areas. The decline in Durum wheat in Argentina has shifted the market to customers desiring low

protein, semi-hard spring wheat. Spring wheat is the preference of Bolivia, Peru, and Iran, which all increased imports in the mid-1980s.

## THE ARGENTINE GRAIN INDUSTRY

The primary corn and soybean production area of Argentina is flat to gently rolling, converted from natural pampas with little clearing required. Drainage problems exist in some areas, but the soils in general are black and fertile. Argentina relies heavily on beef production for domestic and export meat supplies. This beef is grown primarily on rangeland and finished on high-quality pastures. This provides an opportunity if not the necessity of long-term rotations using legumes. Soil tilth and fertility are therefore maintained more through rotations and nitrogen-fixing legumes than through chemical fertilizers. The corn belt in Argentina is also an area of wheat and soybean production, and the southern part of the belt increasingly double-crops soybeans following wheat.

### Production and Marketing Technology

The technology of production—including herbicides, fertilizers, equipment, and cultural practices—is modern and equal to that of U.S. farmers. Large tractors and combines are in common use. Casual observation suggests that tractors may be somewhat smaller than on comparable acreages in the United States, but climatic conditions in Argentina generally permit a longer harvesting and planting season, thereby lessening the need for large equipment to complete cultural practices within a few days. Corn, soybeans, and wheat are harvested with large combines, and delivered primarily by commercial trucks or farm wagons to country elevators or local processors. Little storage,



Photo credit: OTA Argentina Study Team

Argentina's production technology is modern and very similar to U.S. technology.  
This is a typical corn harvester used in Argentina.

drying, or handling equipment is found on farms. However, an increasing number of farmers on larger farms have installed drying and storage equipment.

In the marketing channel, processors and first handlers are highly mechanized with modern handling equipment, including dryers, belts, dump pits, and hoists. A number of elevators and trucks do not have hoists, and hand unloading was observed at several locations. Scales, equipment, and storage bins are similar to those in the United States. Transfer of technology by U.S. and multinational firms is clearly evident in all aspects of production and marketing.

Harvesting in the Argentine corn belt starts at 20 to 25 percent moisture. As in the United States, some farmers push these typical values to higher levels. In most regions winter storms do not present a threat to later harvest, but lodging and potential field losses encourage early harvest. Consequently, nearly all corn must be dried at the country elevator. Most dryers are high-temperature, cross-flow, oil-fired equip-

ment. There is some movement toward multi-stage drying using natural air to remove the last few points of moisture in the storage bin. Concrete silos and metal bins predominate at the country elevator. Platform scales, truck hoists, dump pits, belt and chain conveyors, and vertical legs are common, with designs similar to U.S. equipment. Multisieve cleaners are used for corn before the dryer and during load-out. Outbound grain is cleaned as required to meet the No. 1 grade in response to the Government-mandated premium. Wheat and soybeans are cleaned less frequently, since broken kernels are seldom a problem in these grains.

Export equipment and handling technology include belt and chain conveyors, vertical bucket elevator legs, and concrete silos for inbound grain. Cleaners are available in some export houses to handle infrequent foreign material problems. Outbound equipment is primarily high-speed belt conveyors and telescoping spouts for loading vessels. Grain from trucks can be loaded directly to the vessel with flight-type portable elevators when in-house capacity limitations require.

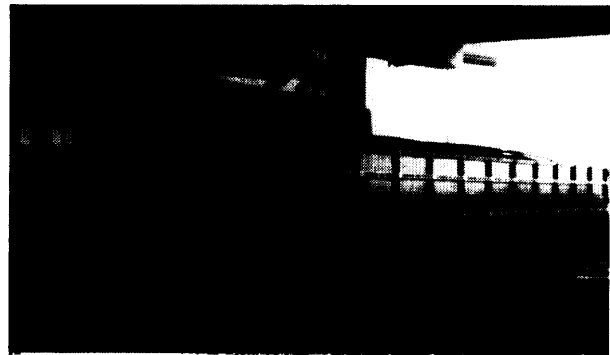


Photo credit: OTA Argentina Study Team

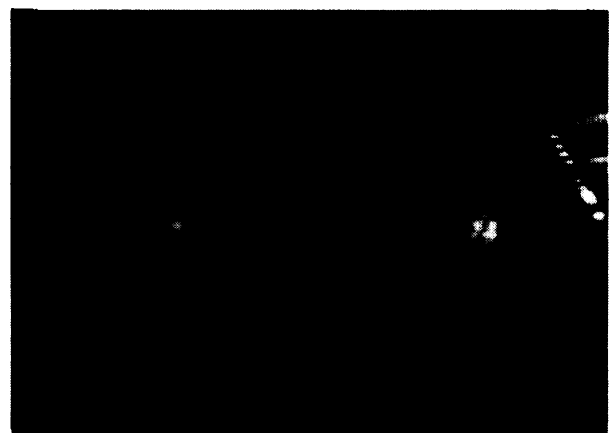
Typical advertising boards indicating technology transfer by U.S. and multinational firms to Argentina.

Transportation from farm to first handler is provided primarily by commercial truckers, although a few elevators and large-scale farmers own trucks. But the majority of the grain is moved through commercial for-hire truckers. Soybeans are moved by truck and rail from the local elevator to the processing plant or to ports. Primary and secondary roads are in good condition, and grain trucks are in evidence on the four-lane motorways.

Unofficial estimates place rail movements at 30 percent of total transportation from the country elevators. Rail is generally considered to be a cheaper form of transportation, but availability and inefficiency discourages the use of rail cars. There are at least three different gauges of railroad tracks in Argentina, creating significant complications in transporting by rail between regions. In addition, nearly all railroads have been oriented toward Buenos Aires. Con-



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sequently, transport to other locations almost necessitates the use of trucks.

Port facilities are modern, although many of those operated by the Junta Nacional de Granos (JNG, the Government agency that regulates the grain industry) are of an earlier vintage and often lack modern renovation. Several new port elevators have been built since the Argentine Government opened the export market to private firms and cooperatives. Further encouragement of private industry has resulted in expansion of existing port facilities and the development of new ones. In late 1987 it was reported that the Government had instructed the JNG to study the privatization of its silos and handling facilities at major ports.

## Marketing Channels and Practices

Corn, soybeans, and wheat move first to the country elevator or local processor or miller. From the country elevator the grain is shipped to export or processing plants or stored for later delivery.

At least one-third of Argentina's soybeans move into the export market on a fairly regular basis. The processing capacity and the quantity of soybeans crushed has grown rapidly, responding to increased production. The quantity exported appears to be a residual over domestic requirements but has almost always been a significant part of the industry. Almost all soybeans are moved from producers to country elevators, although some large-scale farmers have begun to bypass the country elevator and deliver directly to port or processors. Many country elevators also arrange for farmers or commercial truckers to deliver soybeans directly to the plant or port in the name of the country elevator. Exports of soybean meal have increased rapidly in Argentina, tripling between 1981 and 1987. Domestic use of meal for feed has been quite low, with no discernible trend. Since livestock feeding is primarily cattle on forages, the need for soybean meal has been small and limited primarily to a growing poultry industry and a developing swine industry.

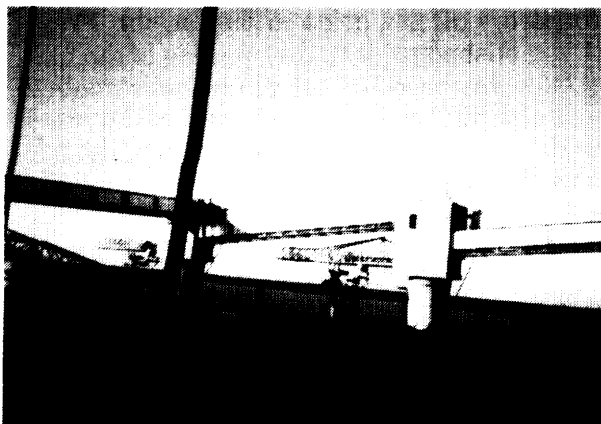


Photo credit" OTA Argentina Study Team

Argentina is increasing soybean production and processing significantly for the export market. Here is the outbound leg of a soybean processing facility under construction near Rosario on the Rio Parana river.

Many corn processors buy directly from farmers, offering the same services as a country elevator. After harvest is completed the processors rely on country elevators for supplies from storage. The market channel is organized around large flows to ports as 4 to 9 MMT are exported annually.

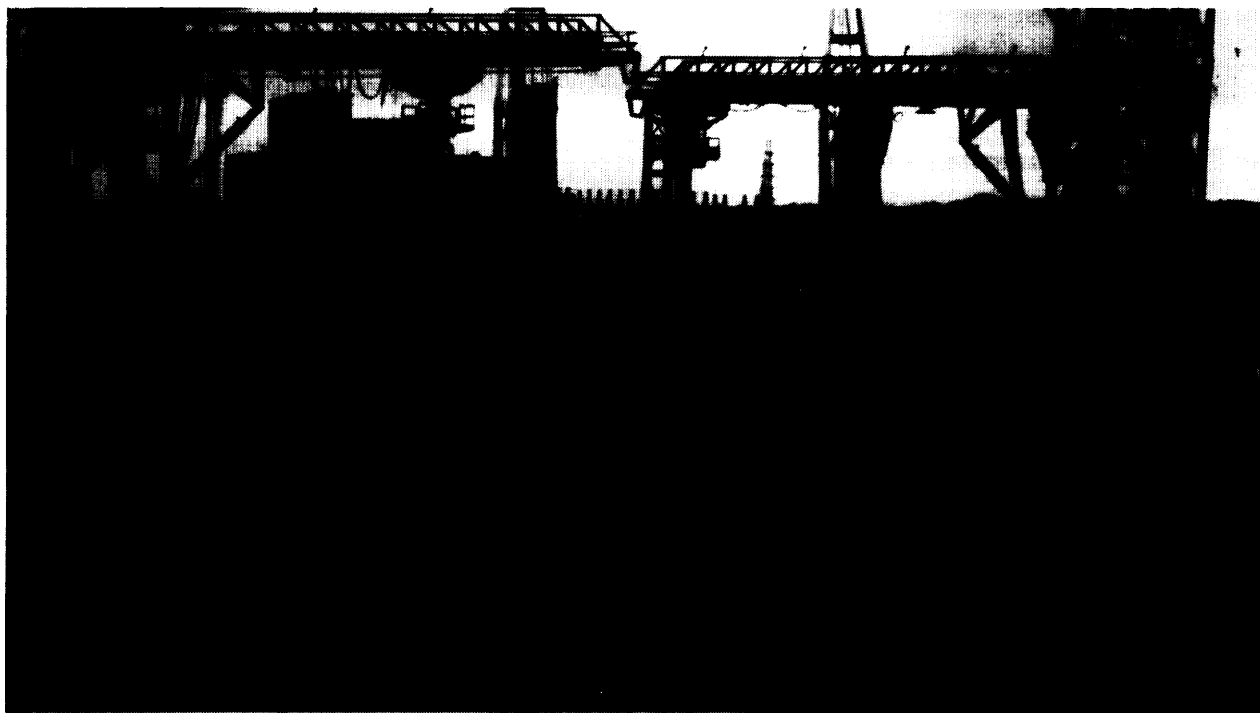
Wheat follows the same market channel. Limited supplies of Durum wheat require preservation of identity in the market channel. Domestic millers using bread wheat are provided assured supplies through a Government allocation program that includes purchase at harvest, storage at public and private warehouses, and export and milling quotas. Minimum price guarantees and generous storage fees assure orderly movements during the season.

## Organization of the Industry

Cooperatives are an important part of the market channel in Argentina, providing not only receiving and handling facilities but processing as well. It is estimated that 40 to 50 percent of grain receipts move through 1,200 country elevators owned by cooperatives. Thirty to forty percent of export volume originates with cooperatives, compared with 15 to 30 percent of actual exports.

The Junta Nacional de Granos owns a number of country elevators and export facilities distributed among the major port areas. With several direct and indirect forms of encouragement from Government, cooperatives are assuming a more prominent position in the export markets. Two modern export houses at the port of Quequen were built by two cooperative Federations—ACA and FACA—and they share a high-speed loading facility and berth for ocean vessels. These facilities opened in 1986 and effectively doubled the capacity of the port, cutting into the volume of the old (1946 vintage) export house operated by JNG.

The Argentine soybean crushing industry has expanded rapidly over the last few years as soybean production and exports of soybean meal increased. These firms crush other oilseeds besides soybeans. The importance of soybeans in



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the crush of individual firms varies from 5 to 100 percent. Unpublished data show 25 processors in 4 provinces, varying in size from 150 MT per day to over 3,800 MT per day. Three of the 25 firms reported capacity above 2,000 MT per day; 8 reported capacity between 1,000 and 2,000 MT per day. Total soybean crush in Argentina was estimated at 2.4 MMT tons in 1983, increased to 5.6 in 1987, and was estimated at 6.2 MMT for 1988.

#### Marketing Practices and Pricing Strategies of Producers

Farmers' marketing strategies in Argentina are dictated primarily by the need for cash flow, repayment of loans, and high interest charges. Country elevators and processors generally provide farmers with the option of a delayed price, in which a prepayment is made at the time the farmer sets the price. They also use forward price contracts as well as spot price at delivery. Prices are established on the basis of daily

quotes from the Bolsa de Cereals at each of the major port areas.

The daily cash prices at each Bolsa become a base from which the country elevators and processors offer a price to the farmer. Prices are established prior to the opening of the market each day based on telephone calls made to the major buyers in the cash market the previous day. The average price of grain at the previous day's close then becomes the base for the next 24 hours. In addition, individual elevators may call processors or individual port elevators and ask for specific bids for available quantities and qualities. All costs including transportation to the port are subtracted from these base prices. The actual quote to the producer is generally the price given by the Bolsa, but all the costs, including the commission charged by the handling firm, are then subtracted to arrive at the farmer's net receipts.

Elevators and handlers consider themselves as brokers even when they are taking title to



the grain. They use back-to-back sales and commission on direct sales to avoid risk of price changes on inventory held in the elevator's name. Only a few of the private elevators stated that they were operating as merchandisers, taking title to the grain and generating income through price changes. Most private firms and all cooperatives identified their sources of income as commission charge and charges for services.

Although the Chicago Board of Trade and the Buenos Aires Bolsa are familiar to nearly every grain handler, country elevators make almost no use of the futures markets in Argentina as a risk-shifting mechanism. Little hedging takes place on the part of the country elevator, and international firms are more likely to be using the Chicago Board of Trade through their offices in other countries than to be covering any large volume on the Argentine futures markets.

### **Government Policies**

The Government establishes minimum price supports as protection for the producers and quotes these in the local currency, Astrals. These prices are adjusted for inflation and are announced prior to planting, as a guide to producers. In addition, the Government establishes minimum prices at which export sales maybe made. This price is quoted in U.S. dollars per ton and is intended to keep control over export volume and prevent currency drain from the country. The minimum price is generally adjusted on a daily basis to keep it in line with actual market conditions. This minimum approximates actual market price but prevents exporters from making sales below the minimum and making up the difference in other types of currencies.

All exports of grain must be registered 24 hours prior to the sale. Any deviation from this registration in terms of quantity, quality, or time of shipment will result in a 15-percent penalty to the exporter. Exporters who specify quantity and destination may renegotiate the registration at a later date. If the registration specifies only quantity, destination unknown, they are not allowed to deliver any above the con-

tract and must deliver within 10 percent of the original volume recorded or pay their 15-percent penalty on the entire contract.

The marketing, milling, and exporting of wheat differs from that of corn and soybeans. The Junta establishes milling requirements for domestic supplies, subtracts these from estimated production, and issues export quotas for the residual. The Junta purchases half the domestic volume of wheat and pays the millers to receive and store it. The other half is purchased on the free market. Millers accept wheat in any of the four numerical grades but must buy on official discounts. The milling industry is responsible for maintaining the quality of wheat stored for the Government, but the JNG inspects the wheat that it has purchased.

The Junta has full responsibility for establishing grading standards, conducting educational programs, licensing inspectors, and grading all export grain. It has the authority to enforce regulations and levy penalties for violations. These controls, in conjunction with the Board's responsibility for export registration, pricing policies, support prices, and credit programs, provide considerable Government influence on Argentine production and marketing. Combined with the power in the Office of the Secretary of Agriculture to control seed varieties, the Government has the ability to control quality and value of Argentine corn, soybeans, and wheat from development of new varieties to final exports.

The role of the Government in influencing quality generally does not extend beyond the port. Although the Argentine Government enters into bilateral agreements with foreign countries, it has little additional involvement in guaranteeing quantity or quality at destination. It does not operate trade offices in importing countries, send inspection teams to supervise destination quality, or do research on the needs and preferences of buyers. The Junta has no organized program of interviewing foreign buyers to identify quality concerns, nor does it document complaints or establish procedures for responding to them.

The Government does have indirect influence on marketing and quality. It has long followed the policy of taxing agriculture to provide public revenue. Those taxes have taken two forms: 1) on imports such as fertilizer and pesticides and 2) on exports. Prior to 1976, export taxes on wheat, corn, and sorghum were as high as 50 percent, although these have been gradually reduced. The effect of these taxes has increased

the cost of production in Argentina and discouraged pesticide use. Despite these obstacles, production has risen. Reduction or removal of the taxes will only encourage further expansion. In late 1987 the export taxes on wheat (5 percent of export value), maize (15 percent), and sorghum (15 percent) were eliminated completely. Taxes on soybeans for export were reduced from 15 to 11 percent.

## QUALITY CONTROL IN ARGENTINA

Grain grading and inspection in Argentina are under the direct control of the inspection department of the Junta Nacional de Granos. Grades are established and administered through the JNG Laboratory. Test equipment is approved, tested, checked, and calibrated by JNG. All inspections and analyses are required to be done by inspectors licensed and trained by JNG. This provides uniformity in application of grades and inspection procedures all the way from farmer deliveries to first handlers through analysis of samples taken during loading of export vessels. Quality control is also tied in with

other departments of JNG, such as the fiscal department and the commercial department's purchases of wheat for milling and export.

### Grades for Corn, Soybeans, and Wheat

Grades for Argentine maize contain only three factors: broken kernels, foreign material, and damaged kernels (table 1-7). Moisture is fixed at a maximum of 14.5 percent for all grades. Broken kernels are defined as material that passes through a 4.76-millimeter (12/64-inch) round-hole sieve. Foreign material is everything other than corn that passes through the sieve and remains on top. Damaged kernels are handpicked from a 50-gram portion and include whole kernels and pieces of kernels that show evidence of damage of the same types described in the USDA standards. The definition of damage is similar to that in the United States standards but the interpretation is much more rigid. Any kernel that is not almost perfect in color and shape is considered damaged. Grades for flint type must contain no more than 3 percent of other types or color. The regulation sample size is 50-grams. However, many inspec-



Photo credit: OTA Argentina Study Team

Junta grain inspector using Boerner-type diverter at Junta Central Laboratory in Buenos Aires.

Table 1-7.—Argentine Standards for Corn (percent)<sup>a</sup>

| Grade           | Damaged kernels | Foreign material | Broken kernels |
|-----------------|-----------------|------------------|----------------|
| No. 1 . . . . . | 3.0             | 1.0              | 2.0            |
| No. 2 . . . . . | 5.0             | 1.5              | 3.0            |
| No. 3 . . . . . | 8.0             | 2.0              | 5.0            |

<sup>a</sup>Maximum moisture for all grades is 14.5 percent.

SOURCE: "Resúmenes De Los Estándares," Antonio Vicente and Nestor Mario Tuzzi, 5th ed., Buenos Aires, Argentina, 1986.



Photo credit: OTA Argentina Study Team

Junta inspector hand-picking foreign material and damaged kernels from corn sample

tors (including JNG) analyze two 50-gram samples and average the results.

Soybeans have only one grade, with maximum limits specified on the following factors: foreign material, broken (splits) and damaged kernels, moisture, other colors, and heat damage as a subset of damage (table 1-8). Foreign material is defined as everything except broken soybeans passing through a 4-millimeter (10/64-inch) round-hole sieve and all material other than soybeans remaining on top of the sieve. Broken kernels, regardless of size, are handpicked from the 50-gram sample. Damaged kernels are also handpicked from the sample and include whole or broken kernels that show evidence of damage. As with corn, the definition of damage is similar to that in U.S. standards but the interpretation is much more rigid—kernels must be almost perfect in color and shape. Although official standards specify a 50-gram sample for analysis, in practice, duplicate

analysis is frequently used requiring two 50-gram samples, i.e., 100 grams of soybeans are actually analyzed.

Grading factors for wheat include test weight, foreign material, damaged kernels (total), heat-damaged kernels, broken kernels, smut, yellow kernels, and moisture. All factors except test weight and moisture are based on a 50-gram portion (table 1-9). The definitions and number of factors are more complex for wheat than for corn and soybeans.

Test weight is based on kilograms per hectoliter. Broken kernels are everything except foreign material that passes through a slotted sieve with 1.6-by-9.5-millimeter holes. Foreign material is anything (including dockage) other than wheat that passes through the slotted sieve and all material other than wheat remaining on the sieve. Damaged kernels and heat-damaged kernels include kernels and pieces of kernels that show the same types of damage described in the U.S. standards, although, again, the interpretation is more rigid. Smut includes any kernel containing smut. Yellow kernels include kernels not considered dark, hard, and vitreous. Protein is not a grade factor but is measured by standard, internationally approved methods and provided as information.

Wheat varieties were historically divided into Durum and semihard spring wheats. As a result of disease problems, difficulty of segregation in the export market channel, and emphasis upon yield, the production of Durum has declined dramatically. The great majority of varieties produced in Argentina and most of their exports are now of semihard, low-protein spring wheat. Separate grading standards exist for spring and Durum wheats.

**Table 1-8.—Argentine Standards for Soybeans (percent)<sup>a</sup>**

| Moisture       | Broken and splits | Damage |      | Foreign material |      |
|----------------|-------------------|--------|------|------------------|------|
|                |                   | Total  | Heat | Total            | Dirt |
| 13.0 . . . . . | 30                | 5.0    | 2.5  | 3                | 0.5  |

<sup>a</sup>Argentina uses only one grade for soybeans with the base for discounts set at 1% impurities including 0.5% dirt. Factor limits shown in this table are maximum values permitted with discounts above the base.

SOURCE: "Resúmenes De Los Estándares," Antonio Vicente and Nestor Mario Tuzzi, 5th ed., Buenos Aires, Argentina, 1956.

## Quality Control Through Genetics

The influence of variety and type on the quality of the corn, soybeans, and wheat is well recognized by the Argentine Government and by industry. The emphasis of producers in selection of seed has been one of maximum profit, which, in general, means maximum yields. As a result, the genetic selection over time has

Table I-9.—Argentine Standards for Wheat<sup>a</sup>(percent)

| Grade   | Density <sup>b</sup> |       | Damage |      | Foreign material | Broken kernels | Not DHV <sup>c</sup> | Smut |
|---------|----------------------|-------|--------|------|------------------|----------------|----------------------|------|
|         | Hlt                  | 1b/bu | Total  | Heat |                  |                |                      |      |
| 1 ..... | 78                   | 60.6  | 1.0    | 0.5  | 0.75             | 1.5            | 15.0                 | 0.1  |
| 2 ..... | 76                   | 59.0  | 2.0    | 1.0  | 1.50             | 3.0            | 25.0                 | 0.2  |
| 3 ..... | 73                   | 56.7  | 3.0    | 1.5  | 3.00             | 5.0            | 40.0                 | 0.3  |

<sup>a</sup>Maximum moisture for all grades is 14.0 percent.

<sup>b</sup>Density is measured in hectoliters and converted to pounds per bushel. All other factors are measured in percent of sample weight.

<sup>c</sup>Not dark hard vitreous kernel.

SOURCE: "Resúmenes De Los Estándares," Antonio Vicente and Nestor Mario Tuzzi, 5th ed., Buenos Aires, Argentina, 1956.

moved toward higher yielding wheat varieties despite the loss of protein content and of some international markets that emphasize baking characteristics. Millers reported a need for higher protein and gluten strength but have found producers and Government agencies unwilling to establish such requirements. Argentine corn has historically been of the flint type. Over the past decade, however, dent varieties have gradually been introduced in the genetic crosses to the point where there may no longer be any significant quantities of the pure flint types known as Plate Maize. Semident and pure dent varieties were being produced in the regions visited by the OTA study team; they were purchased at the same prices as flint by some processing plants and were blended into an "Argentine Maize" a mix of flint and dent at some of the export elevators.

Mandatory licensing provides the Government with some degree of control over the release of new varieties. Currently a committee with representatives from the processing indus-

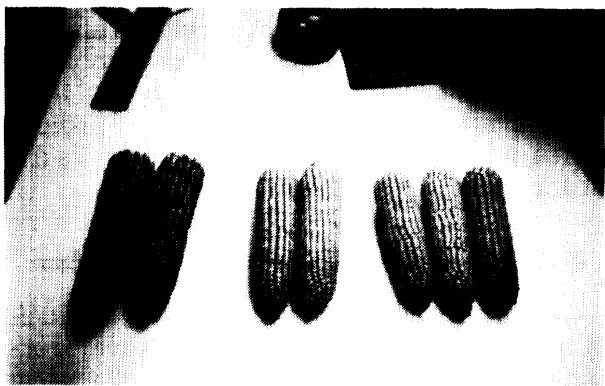


Photo credit: OTA Argentina Study Team

Flint varieties are gradually being replaced by dent varieties. Here are examples of flint, dent, and genetic cross of flint and dent. Flint-type maize is distinguished from dent-type by kernel shape and dark red color.

tries, producer groups, plant breeders, and the Government review characteristics of each variety prior to their approval for licensing and release. The extent of this committee's control differs among the three grains. Although the group has the potential for major impacts upon quality, its emphasis has in fact been on disease resistance, plant characteristics, and yield.

In the case of wheat, protein levels are monitored, but varieties with 10- and 11-percent protein are still approved for release. Baking characteristics are tested and presumably if a variety were submitted that did not meet an unspecified minimum it would be rejected. In fact, most varieties submitted meet this minimum criterion before the plant breeders subject it to full-scale testing.

In the case of corn, flintiness is evaluated and preferred, but visual appearance is the only requirement with respect to hardness and flint characteristics. Protein content, carotene content, and resistance to breakage have all been important characteristics in generating premiums for Argentine maize in previous years—in fact, for many decades. None of these characteristics are essential for approval under the criteria implemented by present committees. The testing procedures are focused primarily on yield and disease resistance.

In the case of soybeans, maturity dates, length of growing season, disease resistance, and yield are the primary criteria used by the evaluation committee. Oil and protein content are recorded but assumed adequate in any variety submitted by the plant breeder. Thus, the potential exists for limiting new varieties to those that equal or better current varieties with respect to oil and protein, but, in practice, value

in processing is not a criterion in the soybean evaluation committee. The use of variety approval holds considerable potential as a method of influencing genetically related quality characteristics.

### Evaluation of Quality in Argentina

The grades and standards for Argentine corn, soybeans, and wheat are relatively simple when contrasted with those in the United States. Fewer grade factors and classes exist for each grain. This fact, combined with centralized control of standards by the Junta, improves the quality of the delivered product. The Junta requirement that all grain in commercial channels must meet Condition Camara (when quality falls within the official grades and maximum limits on moisture) assures proper conditioning and cleaning of grain as close to the production point as feasible. Condition Camara technically applies to all grain sold but is not enforced at the farm level, where most farmers sell corn at moisture levels above Camara specifications. This is acceptable in that the first handler generally charges the farmer for cleaning and drying to assure Condition Camara, and the farmer is paid on the basis of the clean grain. There are instances (e.g., during years of low crop quality) in which a new grade or exception to the grade has been negotiated with the Junta to permit delivery of grain outside of the existing grades. But it must be emphasized that this is a difficult exception to obtain.

With only three significant factors in grade standards for corn and with strict control on moisture for corn, soybeans, and wheat, grain throughout the market channel is more uniform. This reduces the opportunity for blending as a source of income or of upgrading low-quality grain. Whether cause or effect, the industry does not in general have physical facilities that permit or encourage blending. Large, flat storage facilities at the country elevators, a limited number of bins, and cleaners not connected into storage or the grain stream all provide little opportunity for reintroduction of foreign material or damaged grain once it has been removed.

The export house also provides little opportunity for storage of different qualities in different bins. Where the study team was able to observe the loading process, loaders were more likely to be pulling fairly uniform qualities from two or three bins at a time, not blending diverse qualities from large numbers of bins. Uniform quality distributed between one or two grades on inbound grain and on grain in storage makes it a relatively simple operational procedure to load ocean vessels according to contract specifications. Although there appears to be less concern about uniformity among sublets so long as each vessel average equals the contract, it also appears that it is seldom a problem because of the uniform quality of the grain used to load the vessels.

Each export vessel loaded in Argentine ports receives a grade certificate specifying quality factors and grade. A review of the monthly summaries of quality recorded on the certificates between 1982 and 1985 demonstrated that a high proportion of Argentine exports grade No. 1 in the export house. Monthly variations in quality were found and are evidence that export elevators do not consistently clean to zero, nor do they consistently blend to the contract maximum. Quality variability has a seasonal pattern, with breakage and damage levels generally highest at the end of each crop year. Exporters do not clean all grain to zero impurities or broken kernels, but target below the No. 1 limit. If the exporter were blending to the maximum on every load, the average values would have been higher. Exporters who desire to deliver "better than contract quality" could certainly achieve a lower average on several factors. The Argentine grain handling system is equipped to clean to lower levels if there are sufficient economic incentives to exceed the minimum quality permitted under the grade. It appears that the export elevator, in general, ships what is received.

### incentives for Quality in the Argentine System

The Junta Nacional de Granos establishes the discounts and premiums associated with grades

of corn other than No. 2. A premium of 1 percent is automatic for No. 1 corn. A discount of 1.5 percent is automatic for corn grading No. 3. The base price is established in the Bolsa and discounts calculated from that base. Grain delivered below No. 3 is discounted by individual factors. These discounts again are established by JNG. This provides an incentive throughout the market system for striving to deliver No. 1 corn. Since only three factors control numerical grade (broken, impurities, and damage), it is relatively simple and inexpensive for farmers to deliver No. 1 or to pay the elevator to clean and dry their grain to No. 1. The country elevators in turn have an incentive for maintaining quality in storage and for removing broken kernels before shipping into the market channel. The maximum allowances for damage, broken, and foreign material are greater than zero even for No. 1 grain and there is evidence that many grain handlers recognize the opportunity for blending on the grade factors to achieve those maximums allowable for No. 1 corn. These maximums were low enough, however, that the blending opportunities are fairly limited and provided little incentive for the complex system required for the sophisticated blending found in the U.S. grain marketing channel.

U.S. corn standards include a larger number of grades, prices are based on No. 2 corn, and premiums for No. 1 are infrequent and at the option of the buyer. Export contracts generally specify one grade lower than the domestic trade (e.g., No. 3 corn, No. 2 soybeans). Consequently, there is an incentive to deliver the maximum allowed on each factor. The more factors that determine grade and the greater the range between farmer-delivered quality and export contract, the more incentives there are for blending. Since domestic sales need not conform to any of the numerical grades, there is a much greater quality range in the U.S. market channel than in Argentina.

Discounts based on numerical grade give the same price allowances whether the lower grade is determined by one factor or three. Discounts differ widely among elevators in the United States, but in general the sum of discounts on

individual factors for Grade 3 below Grade 2 would be greater in the United States than the 1.5 percent discount for the same grade difference in Argentina. A discount of 1.5 percent for No. 3 corn is equivalent to less than \$0.03 per bushel at U.S. corn prices of \$1.80. Many U.S. elevators have higher discounts. The data available do not suggest that Argentine discounts offer greater incentives for quality improvement than U.S. discounts.

Protein in wheat receives no consistent premium, and the lack of interest in improving protein is evident in plant breeding strategies, farmers' choice of variety, and the disinterest in protein on the part of most merchandisers. Millers would like a higher protein, and exporters occasionally find a premium market for a small volume supply, but the system is not organized to convey this economic information from millers and foreign buyers back to those who control genetic levels of protein. Many U.S. wheat growers receive price differentials based on protein content.

Breakage and breakage susceptibility in corn and soybeans are of increasing concern to elevator managers, exporters, and processors. High-speed, high-temperature drying is generally recognized as a major cause of breakage. Yet, few dryer operators expend time or money to control breakage susceptibility other than to minimize losses from excess breakage within their own plant. Thus, the Argentine system provides incentives for maintaining superior quality in the market system on some measures of quality but only on those incorporated in formal grading standards.

Whether the lack of incentives has resulted in construction of facilities unsuited to blending or whether the construction of facilities limits blending regardless of incentive cannot be determined. Still, it is a fact that incentives exist. Yet the industry in general has not designed, built, or organized facilities and handling equipment to facilitate blending diverse qualities for profit. The Government's maximum moisture in corn at 14.5 percent, in soybeans at 14.0 percent, and in wheat at 14 percent limits the opportunity for wet grain to

move in the market channel. As a result, economic incentives for drying appear to be less important than they are in the United States,

However, shrink factors published by the Junta in official tables are, in fact, quite severe for moisture levels up to 16 percent. The design of the discount table results in a graduated shrink factor per point of excess moisture, with the most severe being the first point of moisture. The shrink per point declines asymptotically to the actual water loss as the initial moisture level increases. This does not provide a deterrent to producers harvesting at 20 to 25 percent moisture. The drying charge at the country elevator plus a shrink factor that is approximately equal to actual weight loss during drying is not conducive to constructing on-farm storage and drying facilities.

There is an additional incentive for quality. This is an intangible and nonquantifiable atti-

tude on the part of most of people throughout the market channel—from producer to exporter to Government official. The study team frequently heard that Argentina is proud of its reputation of quality and is willing to make special efforts to maintain that quality and reputation. This was best reflected in a statement by a Government official: “We cannot compete with the United States with technology, price, and credit terms; we must compete by providing better quality.” This attitude was also echoed throughout the market channel by those who simply assumed that grain would be dried to safe storage levels at the first opportunity in the market channel, that blending was not considered a major source of income, that customer satisfaction was important in order to maintain domestic and international markets, and that the best grain should be exported and problem grain used domestically.

## FINDINGS AND CONCLUSIONS

Argentine grain quality is influenced by several regulations, agencies, and incentives, beginning with variety approval and carrying through inspection at the point of export. Genetic control in corn, soybeans, and wheat has only minor influence on end-use qualities. The latent possibilities have not been exploited as yet.

A simplified grading system, Government-decreed premiums for No. 1 corn, and a Government mandatory grading system that begins at the country elevator encourages clean, dry grain of uniform high quality with respect to grade factors. Argentina has only one grade for soybeans and fewer numerical grades for corn and wheat than the United States. All grain in

Argentina that moves through the market system is required to meet one of these numerical grades. If not, it is rejected and must be used outside the market channel.

Lack of on-farm drying and storage in Argentina results in delivery of most grain at harvest quality prior to storage. And a maximum moisture for commercial trade is mandated. Nearly all grain is stored at safe storage levels, reducing the need or opportunity for blending.

Quality as defined by grade factors is generally better in Argentina than in the United States. Argentina's grain is generally drier, cleaner, and less damaged. However, quality in terms of value for processing is not uniformly superior.