

Chapter 3

The French (EC) Grain System

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The French (EC) Grain System

Traditionally the European Community (EC) was an importer of wheat, particularly stronger wheats used for blending. Since the mid-1970s, however, the EC has become an increasingly competitive net exporter of wheat and, in recent years, a major competitor, although it still imports corn and soybeans. The EC market share of wheat increased from 6 to 17 percent between the mid-1970s and 1987/88. In fact, in the last 10 years the EC is the principal exporting region that has gained market share, mainly at the expense of the United States.

Many factors have influenced these developments. While most recent attention focuses on the pricing policies of the EC and the value of the export restitution, numerous other phenomena are important: productivity growth, generally improving end-use quality, trade policies, and favorable political relations with important growth regions/countries. In addition, the EC

has been the largest exporter of wheat flour relative to other exporters. The quality of wheat in the EC differs from that of others; it is generally considered a lower protein, soft wheat, which produces weak flour. However, the quality varies among members. This is especially true with increased production in recent years of wheat in the United Kingdom (UK), which has had noted problems associated with quality. In France, the principal EC exporter, on the other hand, the quality of wheat has been maintained in the past 10 years despite a substantial increase in productivity.¹

¹This chapter draws on the OTA paper "A Comparison of Quality Factors of the French and United States Grain Systems," based on findings of an OTA study team consisting of Dr. William W. Wilson, Dr. Lowell D. Hill, Mr. Robert A. Zortman, Dr. Michael J. Phillips, and Dr. E. Wesley Peterson (interpreter) that traveled to France in 1987. Dr. Wilson integrated the findings of the study team into the OTA paper.

OVERVIEW OF WHEAT Production AND MARKETING

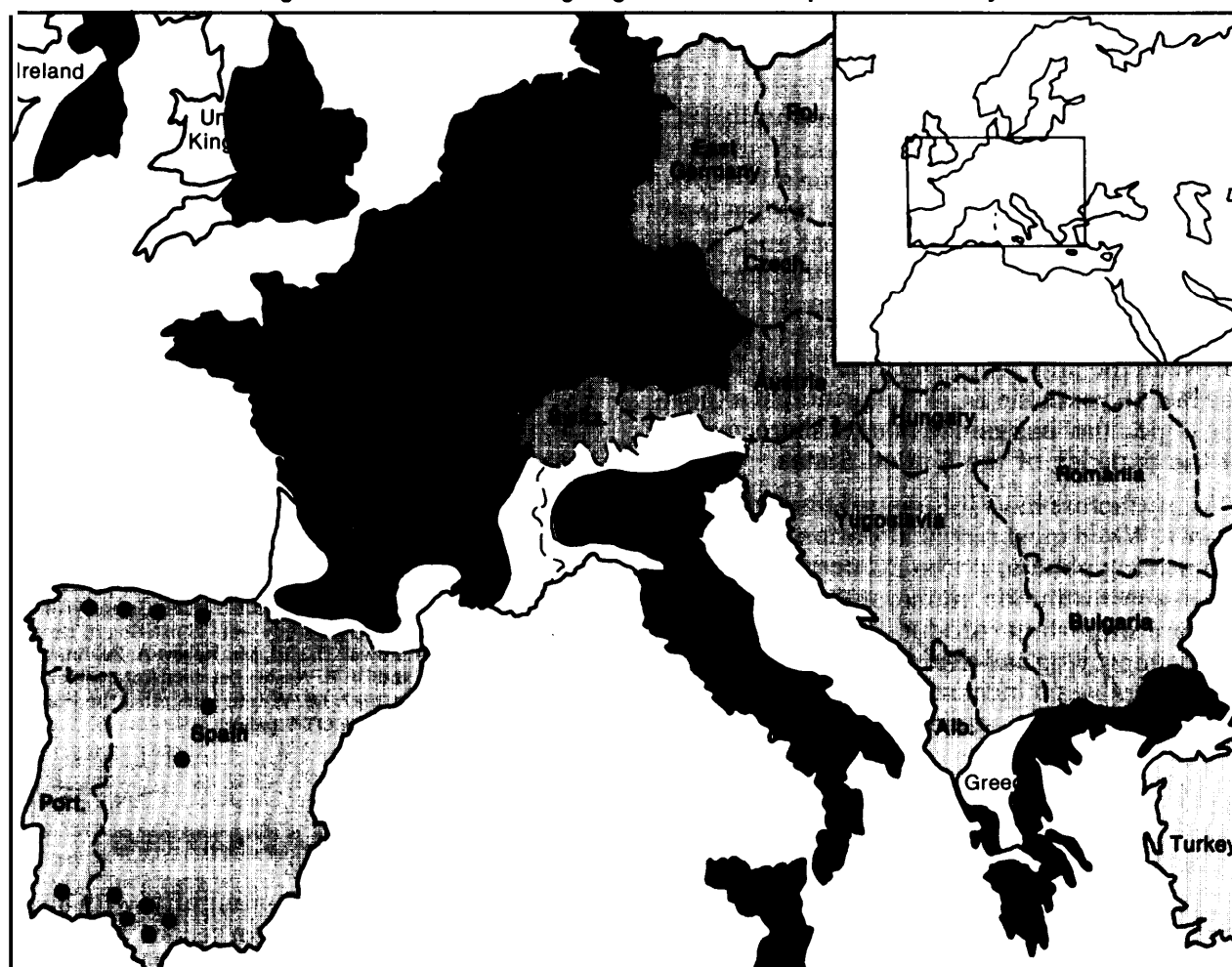
The European Community is a group of countries that joined together in 1957. Originally there were six member countries—Belgium, the Federal Republic of Germany (West Germany), France, Italy, Luxembourg, and the Netherlands. The United Kingdom, Ireland, and Denmark joined in 1973, Greece in 1981, and Spain and Portugal in 1986. Thus, currently 12 countries belong to the EC. Nevertheless, most data at the time of this writing are aggregated for the first 10 members and are thus generally reported as EC10, excluding Spain and Portugal.

Wheat is produced in all EC countries (figure 3-1). Four countries, however, produce over 75 percent of the wheat: France, West Germany, Italy, and United Kingdom. production of wheat in the EC increased from 36 million metric tons (MMT) in the 1960s to a peak of 82 MMT in 1984, and then declined to 70 MMT in 1986 (table 3-1). France is by far the largest

wheat producer in the Community, with about 35 to 40 percent of output in recent years. The relative importance of France in EC wheat production has been fairly constant through time, while Italy's share has declined and that of the United Kingdom has increased. Most of the increased production in the United Kingdom occurred after 1973, which is when that nation joined the Community. The production shares in the other member countries are relatively minor and generally stable. The area of France planted in wheat is 35 to 37 percent of EC total, and average yields generally exceed those of other EC members by a production share of 5 points.

The EC has always been both an importer and exporter of wheat (figure 3-2). Imports have been primarily for blending and improving the strength of the indigenous crop. Prior to 1971, imports generally exceeded exports. Since then

Figure 3-1.—Wheat-Growing Regions of the European Community



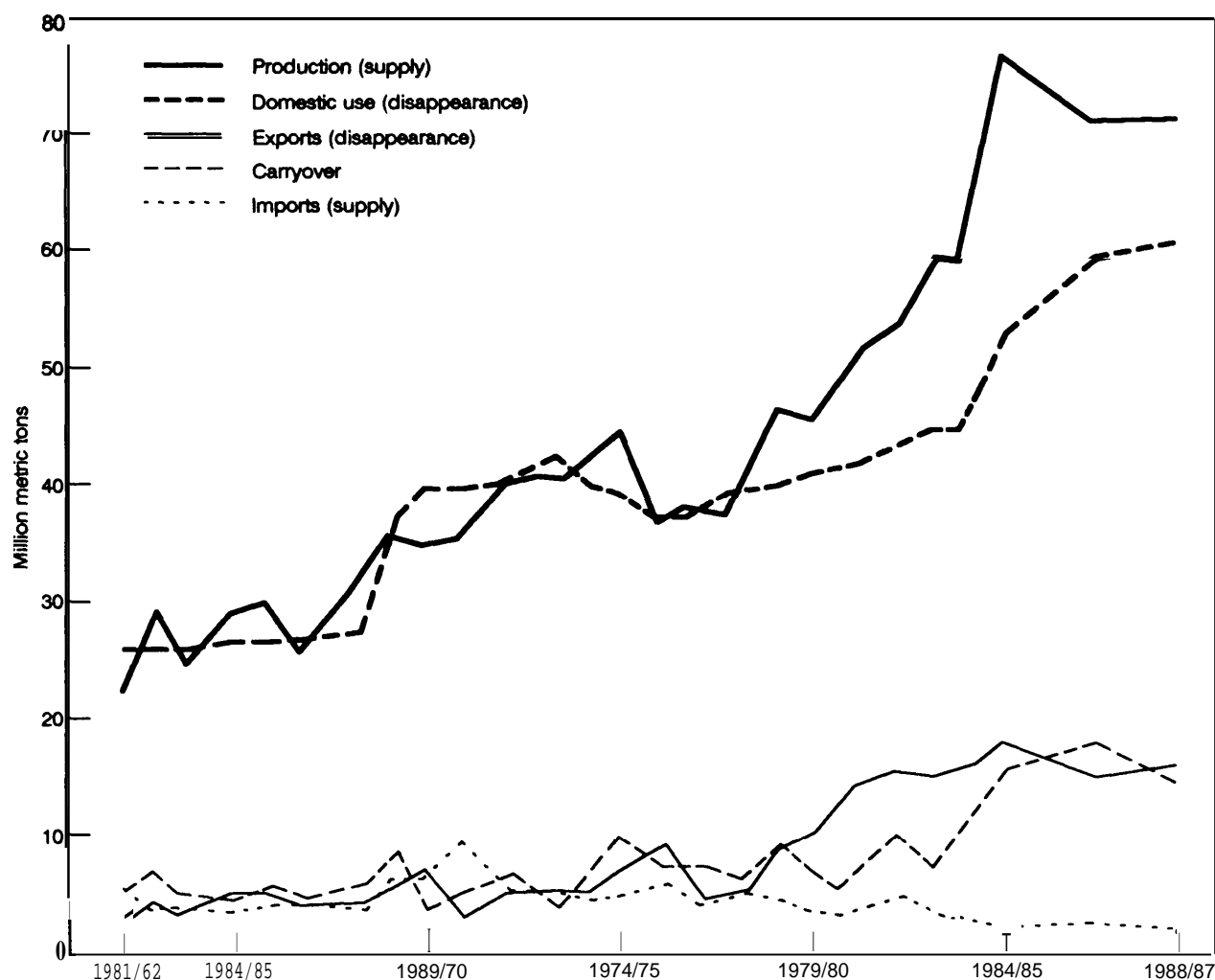
SOURCE: Adapted from U.S. Department of Agriculture, *Major World Crop Areas and Climatic Profiles*, Agriculture Handbook 884, 1987.

Table 3-1.—Share of Wheat Production in the European Community, 1960=86 (percentage)

Country	1960-63	1970-73	1980-83	1984	1985	1986
West Germany.	4.4	14.6	13.7	12.4	13.8	13.8
France.	32.3	35.7	39.0	40.0	40.5	36.4
Italy	22.7	19.6	14.3	12.1	11.9	12.9
Netherlands	1.5	1.5	1.5	1.4	1.2	1.2
Belgium/Luxembourg	2.3	2.1	1.6	1.6	1.7	1.8
United Kingdom	9.0	10.2	15.5	18.1	16.8	19.7
Ireland	1.1	0.6	0.5	0.7	0.9	0.7
Denmark	1.4	1.3	1.7	3.0	2.8	3.2
Greece	4.1	3.9	4.3	2.8	2.5	3.4
Spain	11.4	9.4		7.3	7.4	6.3
Portugal	1.5	1.4	0.6	0.6	0.5	0.5
Total wheat production (MMT)	36.5	48.0	62.1	82.5	71.5	70.3

SOURCE: Toepfer international The EEC Grain Market Regu/at/ens, 1986/87 (Hamburg, West Germany: October 1986)

Figure 3-2.-Wheat Supply and Disappearance for the European Community •



^aSix original member states in 1967/88, 9 member states in 1980/87, thereafter 10 member states

SOURCE: International Wheat Council, *World Wheat Statistics* (London: various issues)

the reverse has been true, and since 1977 exports have exceeded imports at an escalating rate.

Domestic usage of wheat in the EC is quite high. In 1985/86, it accounted for 77 percent of total usage, which is far greater than in the other wheat exporting countries. Domestic utilization has increased somewhat in recent years following a general decline. The primary domestic use is for human consumption in the form of bread products. Compared with other exporters, however, domestic use of wheat for feeding purposes is relatively high in the EC.

In the past 10 years the proportion of wheat used for feed has increased from 25 to 32 percent, and that used for human consumption has decreased from 69 to 60 percent. Thus feed use of wheat has increased in relative importance.

An important feature of the EC marketing system, with implications for quality control and maintenance, is that relatively little is stored between marketing years. This is a result of the Common Agricultural Policy (CAP) and is also likely related to the relatively high cost of storage in France due to climatic conditions. Typically only 15 to 20 percent of wheat produc-

tion is stored, although this has increased in recent years. By comparison, all the other wheat exporters, with the exception of Argentina, store a substantially larger proportion. Since the early 1970s, the share stored has increased significantly in the United States and decreased in Canada.

Productivity

Wheat growing in France is located generally in the area around Paris. Wheat production extends north of Paris, and across to the southwest. There is scattered but relatively minor production in the southern parts of France. The largest five production regions accounted for 55 percent of the wheat in recent years (8).

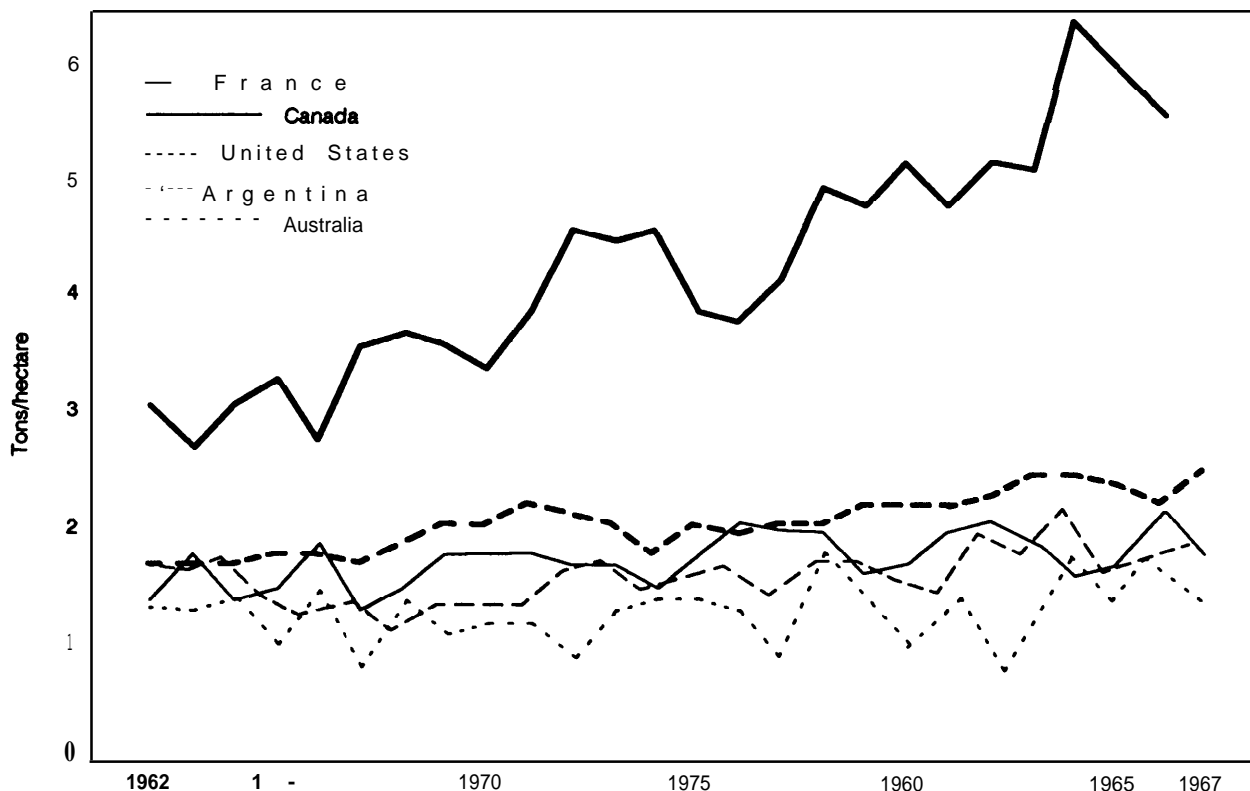
Winter soft wheat is the predominant type produced in France. In addition, small amounts of spring soft wheat and Durum are produced. (Similar comparisons are not available for the

EC.) Though Durum production has been relatively incidental, it has increased substantially in recent years. Yields for winter soft are greater than spring soft, which exceed those of Durum.

Yields in France are substantially greater than in other exporting countries (figure 3-3). In 1986, French wheat yields were 2.5, 2.4, 3.1, and 3.7 times as great as those in Canada, the United States, Argentina, and Australia, respectively. However, yields in France have decreased since their peak in 1984, while they have declined to a lesser extent in the United States, Argentina, and Australia.

To evaluate productivity growth between countries, a semilog model was estimated over the time series 1962-86. France had the fastest growth rate, with an average of 1.3 percent yield growth per year. This compares with 0.73 percent for the United States and lower values for other exporters.

Figure 3-3.-Wheat Yields of Major Exporters



SOURCE: International Wheat Council, *World Wheat Statistics* (London: various issues).

Exports

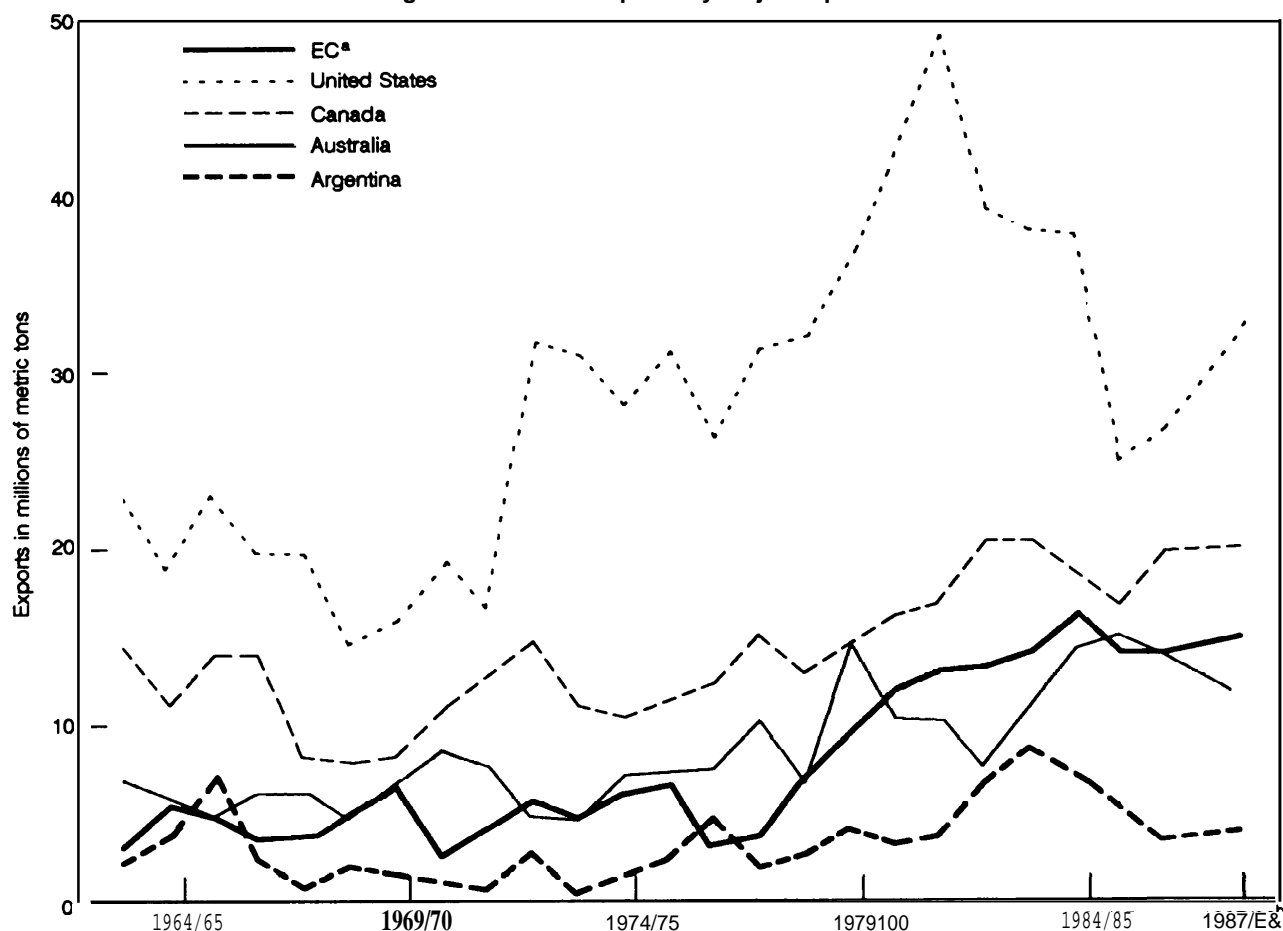
The United States has always been the largest exporter of wheat, followed by Canada, the EC, and Australia, in approximate order of importance. U.S. exports have been more variable than those of other exporters, and decreased between 1981/82 and 1986/87. The EC has traditionally been a relatively minor exporter, but since the mid-1970s exports have increased and the growth has exceeded that of other exporters (figure 3-4). The U.S. market share peaked at 49 percent in 1973/74 but dropped to 29 percent in 1985/86 (figure 3-5). The EC market share increased from 6 percent in the mid-1970s to 17 percent in the recent years. Other ex-

porters have maintained relatively constant positions.

The proportion of production exported can also be compared. The EC exports a relatively small proportion of their production—24 percent in recent years. Other exporters ship substantially greater shares, especially for Canada, Australia, and, to a lesser extent, Argentina. Thus, compared with other countries, exports are relatively less important in the EC.

The largest export markets for the Community (in descending order) are the U. S. S. R., Egypt, Algeria, Poland, Morocco, and Syria (figure 3-6). Other, less important markets are

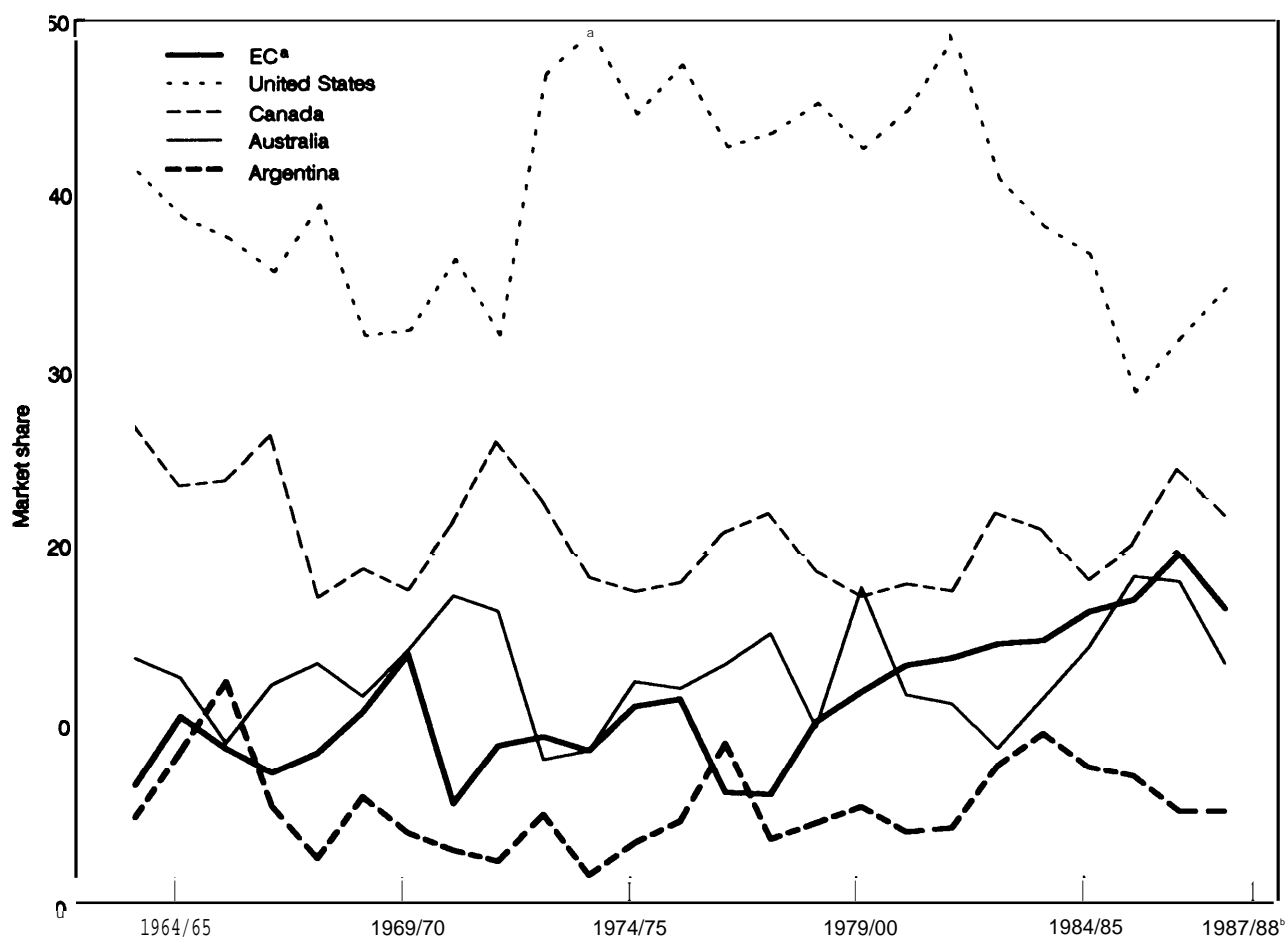
Figure 3-4. Wheat Exports by Major Exporters



* Six original member states in 1971, 9 member states in 1980/81, 10 member states in December 1985, thereafter 12 members
 † Preliminary

SOURCE: International Wheat Council, *World Wheat Statistics* (London: various issues)

Figure \$5. -Market Share of Wheat Exports by Major Exporters



* Six original member states in 1967/68, 9 member states in 1970/71, 10 member states in December 1985, thereafter 12

° Preliminary

SOURCE: International Wheat Council, *World Wheat Statistics* (London: various issues)

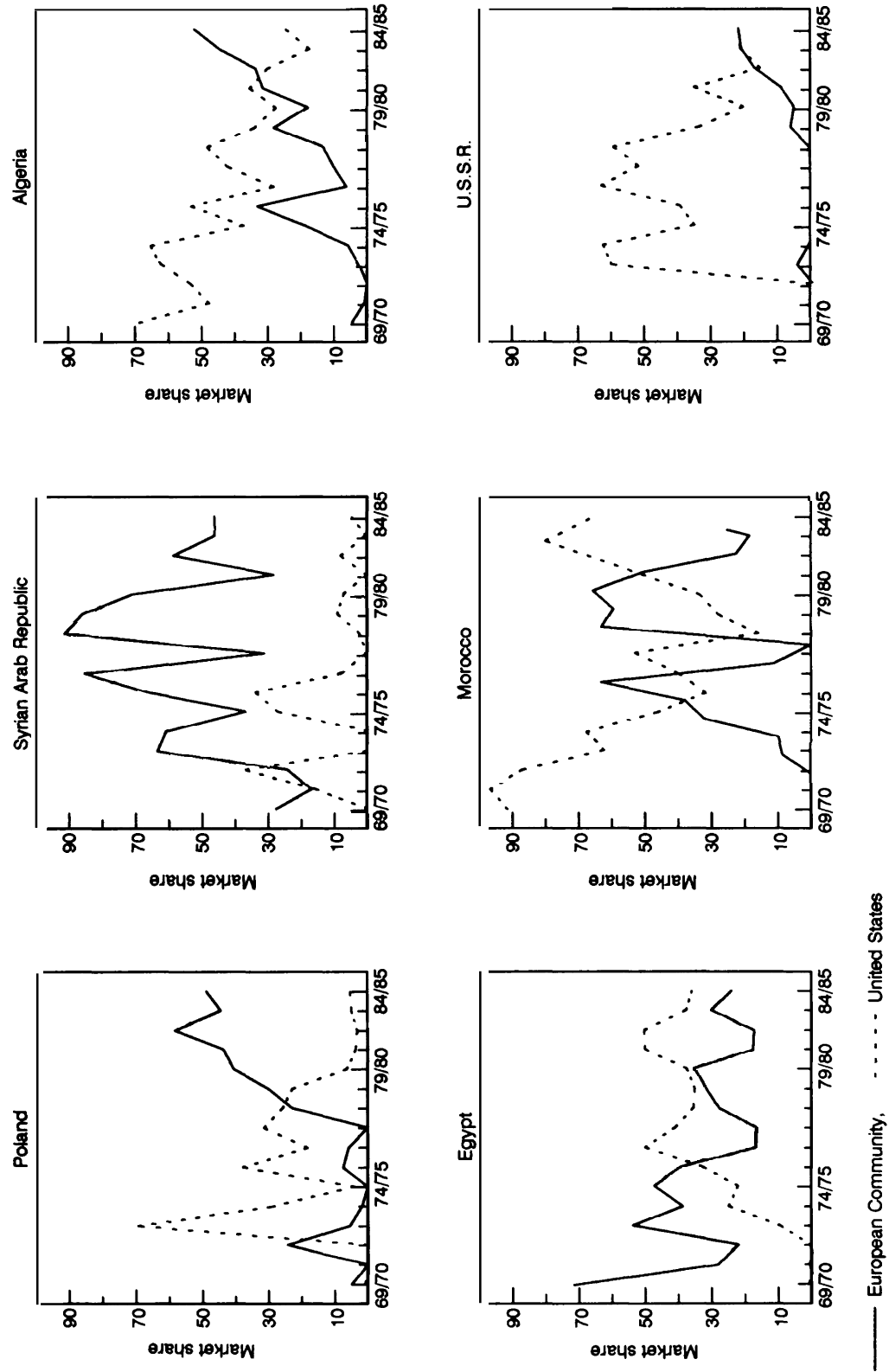
largely located in the Mideast and Africa, which have had above-average growth rates in imports (18). Exports from the EC to the U.S.S.R. were nil in the 1970s, but increased substantially after 1981/82. Following Canada, the EC is the second most important wheat exporter to the U.S.S.R.

The EC market share of the U.S.S.R. market reached 21 percent in recent years, while the U.S. share dropped from 63 percent to nearly 21 percent. Similarly, the EC market share in Algeria went from virtually nil in the early 1970s to over 50 percent in the 1980s while the

U.S. share declined continually. In Poland, too, the EC has shown growth that offset losses for the United States.

The EC is the largest exporter of wheat flour, with dominating positions in each of the principal markets. Compared with other exporting countries, flour exports are of great importance to the EC. In the 1970s from 40 to 70 percent of wheat exports from the Community were in the form of flour (table 3-2). This pattern has been facilitated by important commercial relationships and by the flour export subsidy program of the EC.

Figure 3-6. — Market Share of Wheat for the European Community and United States to Selected Countries



SOURCE: International Wheat Council, *World Wheat Statistics* (London: various issues)

Table 3-2.—Percent of Wheat and Flour Exports That Are Flour

Year	EC*	France	Canada	United States
1963/64	37.1	18.1	9.9	11.1
1964/65	27.7	14.3	7.6	11.1
1965/66	26.0	15.2	6.7	8.6
1966/67	47.5	22.9	6.1	9.3
1967/68	30.8	14.7	7.1	6.9
1968/69	33.0	12.4		11.2
1969/70	24.3	13.6	8.6	10.7
1970/71	64.7	31.7	5.9	7.1
1971/72	52.2	17.9	5.0	7.3
1972/73	41.7	15.1	4.1	3.7
1973/74	47.0	14.9	4.2	3.1
1974/75	34.5	18.5	4.7	2.8
1975/76	37.6	15.7	4.7	2.5
1976/77	61.3	18.6	6.0	6.2
1977/78	69.1	20.9	4.8	4.9
1978/79	44.7	32.8	5.1	4.5
1979/80	40.2	27.2	4.6	4.1
1980/81	34.1	16.6	3.7	4.1
1981/82	31.3	15.1	3.0	2.7
1982/83	21.8	9.3	1.9	4.6
1983/84	26.1	13.4	3.4	5.7
1984/85	22.4	10.5	2.2	3.2
1985/86	24.0	11.0	2.1	4.7

*Six original member states to 1967/68, nine member states to 1980/81, and 10 member states from 1981/82.

SOURCE: International Wheat Council, *World Wheat Statistics* (London: various issues)

In recent years the importance of EC flour exports relative to wheat has declined and it now accounts for 22 percent of exports. Thus, the increase in EC exports noted earlier has been disproportionately larger for wheat than for flour. Also, the percent of exports in the form of flour is less for France than for the EC as a whole, suggesting that other EC member countries must export a larger proportion of flour compared with wheat. Flour is less important for the United States and other wheat exporters. The principal wheat flour market is North Africa, which receives just under half of world exports. This is followed by sub-Saharan Africa. Both of these markets have had fairly rapid growth. Other markets are the Mideast, U. S. S. R., and Latin America, each of which receive declining volumes.

Farm Sector

There are approximately 1 million farms in France of which about 700,000 are considered full-time. More than half of all farms are less than 20 hectares and account for about 15 percent of all farm sales; while 4 percent of all farms exceed 100 hectares and account for

about 25 percent of all farm products. French farms, as American farms, therefore are not a homogeneous entity as structural and income disparity between farms is quite large.

Production technology for wheat is very similar to that used in the United States—especially on large farms. Cultural practices for wheat include plowing, discing, and drilling wheat in the fall. Fertilizer is applied in spring and fall



Photo credit: OTA France Study Team

Production technology used in France is about the same as that in the United States. Shown are typical harvesters and tractor with spring-tooth plow found on the larger farms.

and herbicides and insecticides are used as needed. The study team's casual observation is that more fertilizer is used in wheat production in France than is used in most other countries, including the United States. Attempts to

obtain data to verify this observation proved fruitless since input data is not collected by crop. Intensive use of fertilizer would explain in part France's high productivity of wheat discussed earlier.

WHEAT QUALITY IN FRANCE

Data have been collected by the Institute Technique des Céréales et de Fourrages (ITCF) in France on the quality of wheat as well as other crops. Data obtained for crop years 1976 to 1986 are presented here briefly as a general description and to identify trends. The two most important categories are Standard and Superior milling wheat. Up to 20 production regions are delineated by the ITCF data. Crop quality data are collected by variety, each of which were previously assigned to one of the above categories and aggregated using a weighted average across producing regions (figures 3-7 and 3-8). (The weights used were the percent of planted area to each region during 1987; similar area figures were not available for earlier years.)

Though the protein level for Standard wheat exceeds that of Superior wheat, the other direct measures of quality of protein (strength) are greater for Superior than Standard. This may confirm why the French sometimes rely more on alveograph and Zeleny tests for trad-

ing and policy. Another important observation is that in the past 2 years alveograph measures were substantially greater than the long-term average. Correlations between the quality characteristics and trends are shown in table 3-3. There are positive and significant relationships between protein, Zeleny, and alveograph. Of particular interest is that in general there is no correlation with trend. With one exception, all of these are not significantly different from zero. This indicates that significant positive or negative trends are not apparent and suggests that noted increases in yield have occurred without sacrifices in crop quality. The one exception is that the farinograph of Superior wheat has a significant negative trend.

Wheat samples from the 1987 crop were obtained to compare with U.S. wheat standards and end-use performance. Seven samples were obtained at various locations in France and analyzed using official U.S. methods and procedures (table 3-4). Four of the wheat samples graded U.S. No. 1 and one each graded No. 2,

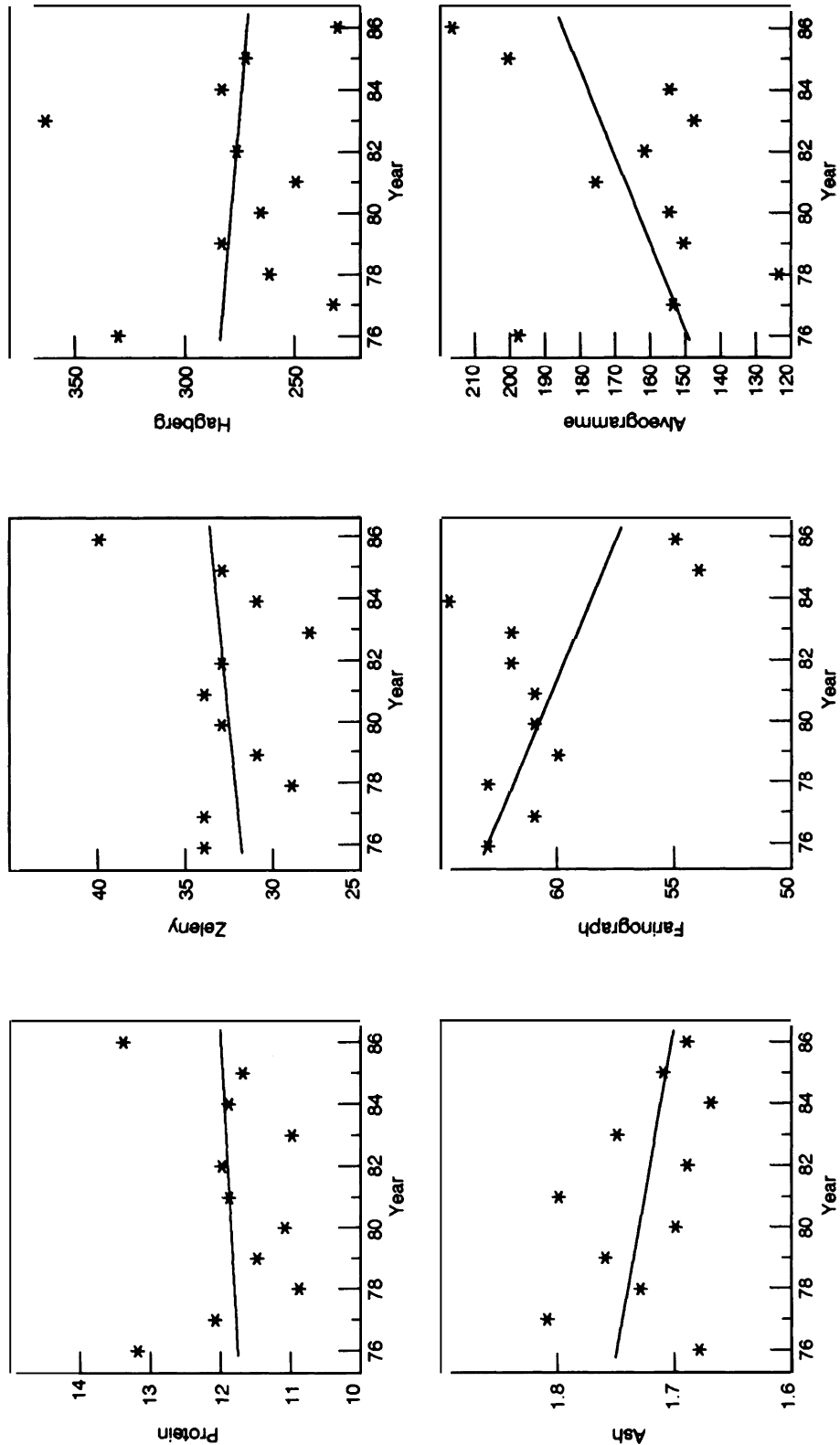
Table 3-3.—Correlation Between Wheat Crop Quality Characteristics and Trend

Characteristics	Protein	Zeleny	Hagberg	Ash	Alveograph	Farinograph	Trend
<i>Superior wheat:</i>							
Protein	1.0	0.83'	-0.19	-0.33	0.80'	-0.28	0.11
Zeleny	—	1.0	-0.58'	-0.13	0.80'	-0.58*	0.22
Hagberg	—	—	1.0	-0.20	-0.14	0.36	-0.08
Ash	—	—	—	1.0	-0.34	0.07	-0.37
Alveograph	—	—	—	—	1.0	-0.67"	0.41
Farinograph	—	—	—	—	—	1.0	-0.57"
Trend	—	—	—	—	—	—	—
<i>Standard wheat:</i>							
Protein	1.0	0.77"	0.13	-0.24	0.81.	—	-0.13
Zeleny	—	1.0	-0.32	0.08	0.63'	—	-0.38
Hagberg	—	—	1.0	-0.82'	0.31	—	0.25
Ash	—	—	—	1.0	-0.73'	—	0.68
Alveograph	—	—	—	—	1.0	—	0.27
Trend	—	—	—	—	—	—	1.0

*Indicates significant figures at the 10-percent level.

SOURCE: Office of Technology Assessment, 1989.

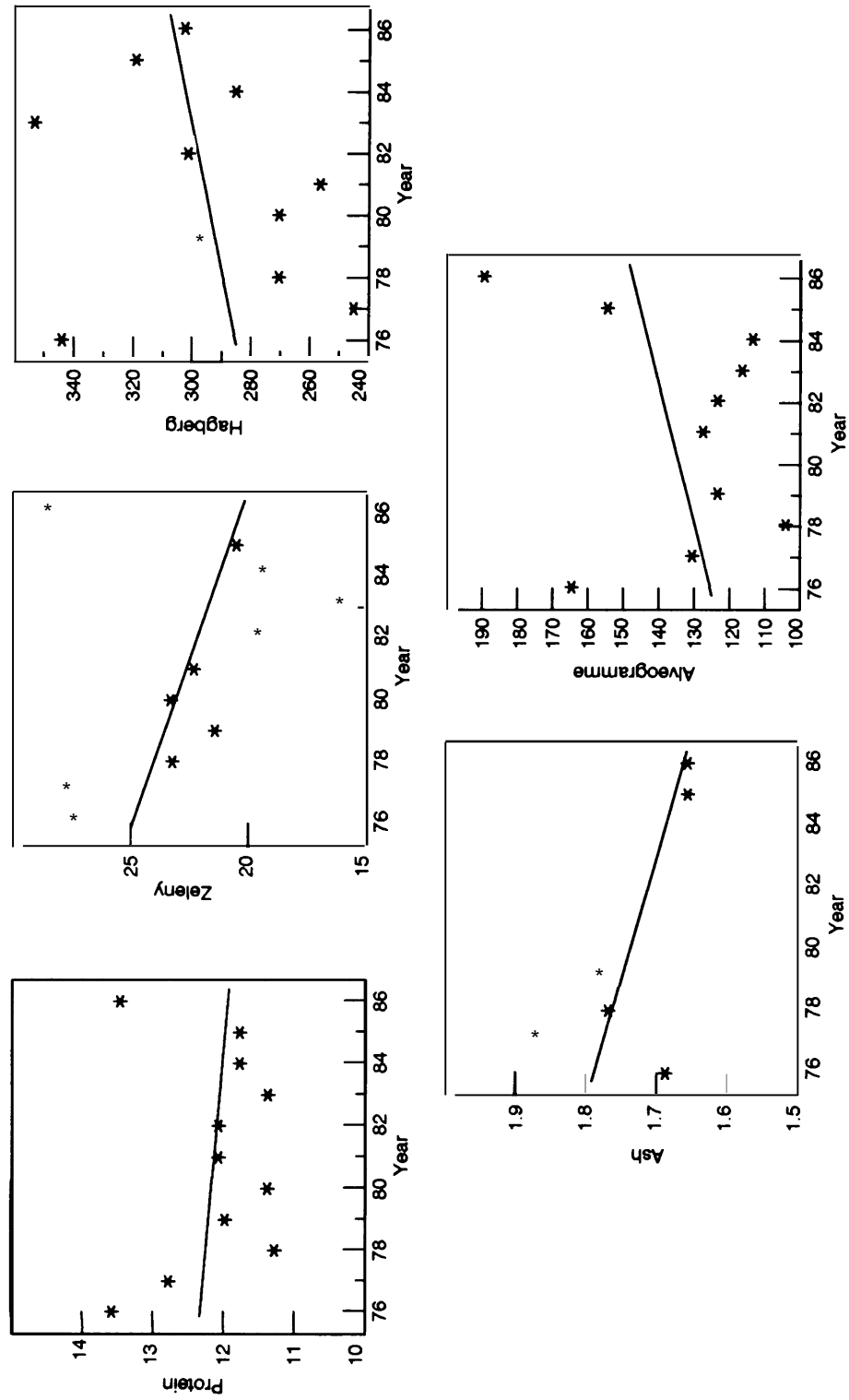
Figure 3-7.— Trends in Wheat Quality in France: Superior Wheat



* Actual data, — Predicted data

SOURCE: Institute Technique des Cereales et de Fourrages, Annual Reports, 1976-86 (6)

Figure 3-8.— Trends in Wheat Quality in France: Standard Wheat



* Actual data, — Predicted data

SOURCE: Institut Technique des Cereales et de Fourrages, Annual Reports, 1978-88 (6)

Table 3-4.—Analytical Results of French Wheat With Comparison to U.S. Factors

Site	Grade	Dockage 0/0	FM 0/0	DKT %	U.S. grade and factors				Miscellaneous impurities %	French factors		
					Shrunken and broken kernels %	Defects %	Moisture %	TW %		Total impurities %	Sprout 0/0	Broken
Sica, Rouen	1 SRW	0.4	0.1		0.5	1.6	14.1		0.3	1.1	0.5	1.9
Sica, LaRochelle	1 SRW	0.1	0.0	0.5	0.2	0.7	14.1		0.1	0.2	0.5	3.4
Sica, LaRochelle	1 SRW	0.1	0.0	0.0	0.2	0.2	14.1		0.05	0.15	0.0	2.2
LaFarcide, Blois.	3 SRW	0.2	0.2	4.5	0.3	5.0	11.6	61.5	0.2	0.6	4.5	1.9
Barett Farms, Authieux.	1 SRW	0.61	0.11		0.6	2.1	12.3	59.2	0.3	0.8	1.4	4.6
Coop Drecx, Loons ^a	2 SRW	0.26	0.1	3.5	0.4	4.0	13.9		0.1	0.4	3.5	4.1
Benoist Orgerus.	4 SRW	0.0	0.0	7.9	0.0	7.9	13.35	60.4	0.1	0.1	7.9	0.2
Average		0.24	0.07	6.9	1.2	3.07			0.2	0.5	2.6	2.6

^aComposite of 13 farms

FM = Foreign material

DKT = Damage kernel total

TW = Test weight

SOURCE: Office of Technology Assessment, 1989.

No. 3, and No. 4. Averages for each of the U.S. factors and comparable French factors are also shown.

The seven wheat samples were also analyzed for end-use performance for soft wheat at the Soft Wheat Quality research lab at Wooster,

OH. The results indicated that none of the soft wheat would be acceptable as U.S. soft wheat flours based on a number of tests. Generally, the French wheats are an intermediate quality, somewhere between U.S. soft and Hard Red Winter wheats.

EUROPEAN COMMUNITY PRICE AND INCOME POLICIES

In 1962 the Common Agricultural Policy was enacted, which is the overriding policy affecting agriculture in the EC. Its specific goals were to encourage increased production, stabilize markets, ensure a fair standard of living to the farm sector, and encourage security of supply. The three overriding principles of the CAP are:

1. creation of a single community market,
2. an internal preference for community products, and
3. common sharing of policy costs.²

These objectives have led to a complex system of mechanisms to regulate the market. As discussed in this section, there are no official grade standards in the EC or individual countries, and it is the criteria for the intervention price mechanism that has important impacts on quality control. Further, distinct efforts have been made to change these criteria to achieve policy objectives.

The most important prices and regulations in the EC are target and threshold prices, intervention prices, variable import levies, and export subsidies. The target and threshold price are somewhat generic and are not directly influenced by quality. The target reflects the price that EC producers should receive for their grain. The threshold price is related to the target price by marketing costs and represents the minimum price for importing wheat. Given that world prices are generally below the threshold, a variable import levy (VIL) is calculated generally as the difference between these prices (e.g., threshold price minus world price). Complex adjustments are made in the VIL devia-

tions to account for quality differentials of imported wheat and external marketing and transportation costs.

Since EC domestic prices generally exceed world prices, and since production has increased, the CAP uses an export restitution or subsidy to allow disposal of surpluses. In general, the export subsidies are the differences between local and world prices. Actual export refunds can be established by traders using fixed refunds for each zone ("droit commun"), or by tender. Increasingly in recent years the latter has become the dominant mechanism. As a result, the EC has had increased discretion about the value of export refunds. In the past these have been generic across the quality of wheat being exported. In 1986/87, however, the EC allowed a 10 European Currency Unit (ECU) per MT larger subsidy for milling wheat being exported from France than for feed wheat being exported from the United Kingdom, due to the superior quality of the French wheat. The differential has been eliminated in 1987/88 because of the deteriorated quality of the French crop, and likely because of political problems administering differentials between countries.

Recent Developments

The single most important policy instrument affecting producer price levels and quality in the EC is the intervention price (IP). It is at this level at which the EC is obligated to purchase wheat so long as it meets certain quality and eligibility criteria. The IP is similar to the U.S. loan rate, both providing a price floor below which local prices seldom fall. An important difference, however, is that there is 100-percent eligibility in the EC so long as quality require-

²Material in this section draws from: references 7 and 17; and various issues of Toepfer International.

ments are met, whereas in the United States producers have to be program participants.

Intervention prices are negotiated in ECUs, which is a common price across all member countries. Monetary Compensatory Units (MCUs) then apply to individual countries for currency translation. Thus, prices in a local currency may change in the opposite direction of a change in the 1P if there has been a change in the MCU. Intervention prices and MCUs are set annually by the European Commission for the first month of the marketing year. Monthly increments are legislated for sales to intervention in later months.

The EC also sets price differences in the 1P for different qualities of wheat. The recent history of EC policy prices is shown in table 3-5. Target and threshold prices increased through 1983/84, decreasing moderately thereafter. In 1982/83, the European Commission was starting to be concerned about EC prices getting out of line with world prices. However, program prices did not begin to decline until 1984/85. Intervention prices generally changed in the same magnitude as the target price.

Given the downward pressure on market prices relative to the 1P in recent years, the European Commission has adopted a number

of measures to reduce the use of the intervention mechanism. Two of these have been direct reduction in the realized intervention price. As of July 1986 the EC introduced a co-responsibility levy of 5.38 ECU/MT, or 3 percent. This is essentially a tax on production to be collected at the point of first sale. The purpose of the tax was to "make producers feel the real realities of the market." Realized intervention prices were reduced another 6 percent beginning with the 1987/88 marketing year. Effectively the intervention agency of each country could pay only 94 percent of the nominal intervention price, and only during certain periods. These adjustments are ex-post and therefore not reflected in the prices shown in table 3-5. However, the point is that the effect is to reduce the floor under which producer prices are supported.

In addition, three indirect actions have been introduced over time that essentially reduce the attractiveness of the intervention. First, the period in which grain could be eligible for intervention has been reduced. Second, in recent years payment is deferred. In 1987/88 for example, payment would be deferred for 110 days, implying a forgone cost of interest of 3 to 4 percent. Third, the minimum quality standards to be eligible for intervention have been tightened

Table 3-5.—European Community Intervention Quality Requirements for Wheat

Requirement	Feed wheat			Bread wheat			Quality wheat	
	1987/88	1986/87	1984/85	1987/88	1986/87	1984/85 ^a	1987/88	1986/87
Sound basic grain. % min	88	88	88	88	88	90	88	88
Moisture ^b % max	14.5-15.5	14	16	14.5-15.5	14	16	14.5-15.5	14
Natural weight. Kg/Hl min	72	72	68	72	72	72	72	72
Broken grains % max	5	5	5	5	5	5	5	5
Grain and mixture. 0/0 max	12	12	12	12	12	5	12	12
Inc. shrunken kernels. 0/0 max	12	12	12	12	12	—	12	12
Impurities. 0/0 max	3	3	3	3	3	3	3	3
Sprouted grains 0/0 max	6	6	8	6	6	6	6	6
Germination.	—	—	—	85	—	—	85	—
Falling no.	—	—	—	220	220	180	240	240
Protein ^c	—	—	—	9.5	9.5	10.5	14	—
Sedimentation	—	—	—	20	20	—	35	35
Dough test ^d	—	—	—	positive	positive	—	positive	positive
Relevant intervention price (ECU)	170	170	183	179	179	196	183	183

^aFactors limits listed are for the "minimum quality" reference price; to be eligible for the "medium quality" reference price protein must be 11.5 percent, sedimentation 25, and falling number 260.

^bDiffers by country.

^c(N x 5.7) of dry matter.

^dFirst stage of the European baking test.

SOURCE: Office of Technology Assessment, 1989.

periodically. These changes are discussed in the next section.

Administration of the Intervention Price Mechanism

Each member country has an intervention authority that is responsible for administering EC policies. In France, this is Office National Interprofessionnel des Céréales (ONIC). Only licensed elevators (OS) are eligible to sell grains to ONIC—i.e., producers cannot use the programs directly, as in the United States. If an OS elevator decides its best marketing option is the intervention mechanism, the managers contact ONIC with quality specifications and locations. ONIC can take possession or ask the OS elevator to store the grain for them under a negotiated rate. ONIC pays the OS after the deferred time period, including monthly increments in accordance with the month of sale. Quality is determined at the expense of the seller. If either party rejects the first analysis of quality, a second may be used, the results of which are binding. Costs of the second analysis would beat the expense of the losing party.

In general, one of the responses of the European Commission in recent years has been to tighten the quality standards to be eligible for intervention. This has reduced the attractiveness of the intervention mechanism, resulting in lower market prices. The quality requirements were consistent during the period 1982/83 to 1985/86.

The EC system recognizes three types of wheat for purposes of intervention—feed, bread, and quality. In some cases the factor limits are the same. The principal differences

between bread and feed wheat are the end-use characteristics represented by germination, falling number, protein, sedimentation, and a dough test. Thus to be eligible for the higher intervention price of bread wheat, minimum levels of these characteristics are required. If these characteristics are sufficiently high, the wheat would be eligible for the intervention price for quality wheat.

A number of important changes have been made in recent years. Falling number requirements were increased and protein decreased for bread wheat in 1986/87. Test weight was increased for feed wheat from 68 to 72 kilograms per hectoliter (kg/hl) in 1986/87, even though the EC recommended higher levels. Another end-use test, germination, was introduced for bread and quality wheat in 1986/87. There has been much controversy about changes in moisture requirements. In 1986/87 moisture was decreased from 16 to 14 percent for bread wheat and feed wheat. However, actual implementation was at the discretion of the individual countries, and allowances were made up to 15 percent if subjected to adverse weather. In 1987/88 individual countries were allowed to fix higher ceiling levels for moisture. Some chose 15.5 percent; others, including France, chose 15 percent.

The intervention prices described in table 3-5 are subject to legislated premium and discounts for certain quality factors. Implicit in the prices is a premium of 3.59 ECU/MT for quality wheat over bread wheat, and 9 ECU/MT for bread wheat over feed wheat. Other adjustments exist for moisture, test weight, and individual factors.

THE FRENCH GRAIN INDUSTRY

The grain marketing system in France is dominated by farmer-owned cooperatives for origination and multinational traders for exports to third countries. Transactions between parties

are largely determined by private negotiations, with some terms standardized. Most of the conditioning of grain that does occur happens at the point of origination.

Marketing Channels

About 70 percent of the grain that enters the French marketing system is originated by farmer-owned cooperatives; the balance is from private and multinational traders. Grain for domestic use is shipped largely by truck, and to a lesser extent by barge and rail. Most flour mills are located close to the production point, and they are relatively dispersed, thereby requiring transport over relatively short distances.

Sixteen ports in France export grain but the Port of Rouen dominates, with 47 to 53 percent of total grain exports. The four largest ports in 1985/86 handled 76 percent of the grain exports from France (10).

Although trucks dominate, rail transport has been increasing. Unit trains commonly used have 20 cars holding 60 tons per car (a total of about 44,000 bushels per train). Shippers can use either their own boxcars, or those of a pool owned by private companies. Barges are active in northern France but have difficulty competing with railroads, which are indirectly subsidized by the Government.

Organization of Firms in Wheat Marketing

The French wheat marketing industry has three key components. One is the farmer-owned cooperatives largely involved in origination and, to a limited extent, exporting. The second is the private grain traders, some of which are French and others multinational. These firms specialize largely in cost, insurance, and freight sales (c.i.f.). The third is the domestic milling industry.

Cooperatives

Much of the present marketing system is based on developments in the world wheat economy of the 1930s. At that time ONIC operated as a national market board and all grain had to be sold to OS storage facility elevators, which collected taxes and administered quotas. As noted earlier, OS elevators still exist even



Photo credit: OTA France Study Team

Trucks provide most of the transportation for grain to domestic destinations and to port. Here a truck is unloading wheat at the port of La Rochelle.

though ONIC no longer operates as a national wheat board. Any firm can be licensed as an OS elevator so long as certain conditions are met.

A large proportion of the grain is delivered to the local OS elevator at the time of harvest due to generally limited on-farm storage. Mechanisms are set up through ONIC and the OS elevators for financing of harvest sales. Farmer-owned cooperatives are the dominant first handler of grain in France, with about 70 percent of the origination. They are similar in structure to those in the United States. Functions performed by these elevators include origination, conditioning, storage, financing, and input sales.

Two national unions of cooperatives exist. One (UNCAC) was originally created to promote production and export of French grains. It represents about 60 to 65 percent of the local cooperatives. In the last 5 years UNCAC has been active in exports, in part through its recent affiliation with Toepfer. About 70 percent of their export sales are made within the EC. As a matter of policy they are not active in domestic transactions (e.g., to processors) that

would be competitive with their members. The other national cooperative (UGCAF) is not active in exports and is primarily involved in inputs.

The local elevators visited by the study team largely operated multiplant satellite-type systems. Many collection points exist for origination, storage, conditioning, and, to some extent, transshipment to larger houses. Two examples include the Sarthe and CAVAC. Sarthe has 15,000 members, and sales are distributed—with 30 percent from crops, 30 percent from livestock, and 40 percent from inputs. They operate 60 collection points with shipments either by truck or rail, depending on the economics. Total storage capacity is 320,000 MT. Sarthe is affiliated with UNCAC. CAVAC is located in west central France and has 100 silos, but only 6 or 7 large ones. Total storage capacity is 165,000 MT, and 60 percent of the grain handled is exported through their own export elevator.

Exporters

Most of the grain shipped from France is by the multinational exporters, though there are several private French companies (e. g., Levy, Souffle). Also, as indicated above, cooperatives are involved in exports to a limited extent, particularly to other EC countries. Some of the ex-

porters operate their own facilities, while others simply buy f.o.b. and make c.i.f. sales. Only a few private exporters are involved in origination, largely because of the dominance of the cooperatives as first handlers. Cargill has recently expanded in-country origination. The private exporters dominate in sales to non-EC destinations. Perhaps the single most important risk in exporting is that of fixing restitutions with the EC for third-country sales. Thus, the risk of restitutions and documentation apparently provide significant barriers to small-scale exporters.

Milling Industry

The flour milling industry in France is very diverse and fragmented. Most of the firms are family-owned, and about 20 percent of the capacity is owned by cooperatives. A total of 1,215 mills produced 5 million MT of flour in 1985. The largest company is Grand Moulin de Paris, which has 15 to 20 percent of the market share and produces 900,000 MT of flour in 14 mills. It is the dominant exporter and is also involved in the gluten industry. The mills are dispersed geographically and are largely located at the point of wheat production (11).

An important reason for the current structure and operating practices of the industry is the quota system. In 1935 there were 9,000 mills, flour consumption was declining, and there was a surplus of wheat. In order to control supply a quota mechanism was implemented, with maximum allocations of wheat per mill. Thus, even though many firms left the industry, the remaining could not readily expand output. The quota system still exists today, but its administration has been liberalized. Part of the reason for the tremendous competitiveness of flour exporters is that the purchase of wheat for flour that will be exported is exempted from quotas. Thus firms with excess capacity, and likely low marginal milling costs, could utilize that capacity for export.

An important feature of the milling and baking industry in France is that of gluten. This industry began in the mid-1970s to extract gluten from wheat. Gluten is used as an additive to



Photo credit: OTA France Study Team

Local elevators are similar in structure to those in the United States. They are owned largely by national cooperatives and are part of multi plant satellite systems that originate, store, condition, and transship grain to large facilities.



Photo credit: OTA France Study Team

French port facilities use technology similar to that used in the United States for loading ships. Here a ship is being loaded with wheat at the port of La Rochelle.

low-protein wheat to produce leavened breads. This technological development has been an important growth industry in France and the EC, and has provided much flexibility for the millers in meeting contract specifications.

Storage Capacity and Elevator Equipment

In January 1985 total storage capacity was 53 MMT (table 3-6); by comparison, total grain production in France in the past 6 years has ranged from 46 to 59 MMT. Nearly half the capacity is at the country elevator level, followed by on-farm and terminal silos. In 1985 the average turnover rate (average of the best marketed production over the past 5 years divided by total storage capacity) of the country elevator sector was 1.56.

There is a drastic disparity in the average size of elevators. Forty percent of the country elevators have less than 1,000 MT storage capacity, and can hold about 5 percent of the marketed production. Most of the country elevators serve as collection points and ship to more central elevators for conditioning and reshipment.

In 1986, 64 percent of the country elevators were owned by cooperatives and the average capacity of all such elevators was 3,833 MT (table 3-7). Most country elevators are served exclusively by truck, with about 20 percent and 4 percent also served respectively, by rail and truck. The average terminal elevator holds 20,195 MT. Nearly one-third of the country elevators are equipped with dryers, but only 17 percent of the terminals have dryers. However, the latter have greater capacity. Most of the ele-

Table 3-6.—Storage Capacity for All Grains in France, 1985 and 1986

Storage site	Capacity (M MT)		Percent	
	January 1985	August 1986	January 1985	
On-farm	17.5	NA	33	
Silos and cells	(10.2)	NA	(151)	
Threshing floors	(5.2)	NA	(10)	
Corn cribs	(21)	NA	(4)	
Country elevator	25.8	29.4	48	
Cooperatives	(18.5)	(21.5)	(35)	
Private merchants	(6.0)	(6.5)	(n)	
Other	(1.3)	(1.4)	(2)	
Terminal silos	5.6	6.9	11	
Marketing centre	(21)	(2.7)	(4)	
Sea ports	(1.4)	(1.6)	(3)	
River ports	(21)	(2.6)	(4)	
ONIC (rented)	2.2	2.9	4	
Processors	1.9	1.9	4	
Wheat milling	(n)	(n)	(2)	
Feed	(0.8)	(0.8)	(2)	
Total	53.0	—	100	

SOURCE: Port Authority of Rouen.

vators have ventilation equipment. The average cleaning capacity at the country elevator level is 35 MT/hour, substantially lower than at the terminal elevator.

Conditioning³

In general, grain is conditioned (dried, cleaned, and treated for insects) at the first receiving grain elevator. Since grain is conditioned when stored, it is not subject to deterioration during storage. Country elevators and receiving points are equipped with modern technology. Cleaners, barley sizers, dump pits, loading legs, belts, and augers were similar to those found in elevators throughout the United States. Based on a small sample, there does appear to be more use of the Redler chain conveyor in place of belt conveyors prevalent in the United States.

The study team also observed a different type of storage facility, which from the outside appeared to be a long, flat building, but inside consisted of numerous vertical bins. These bins are often filled by along conveyor, either belt or chain, running the length of the long building

under thereof, with the individual bins filled by a diversion off the chain conveyor.

Sampling equipment differs markedly among individual elevators, with one observed by the study team using a very primitive type of pan or bucket at the endgate, with one or more samples being used to represent the truckload. Others have hydraulic-operated vacuum probes. There appears to be no requirement on the part of Government agencies as to the method of sampling, which is left to the discretion of the individual operators.

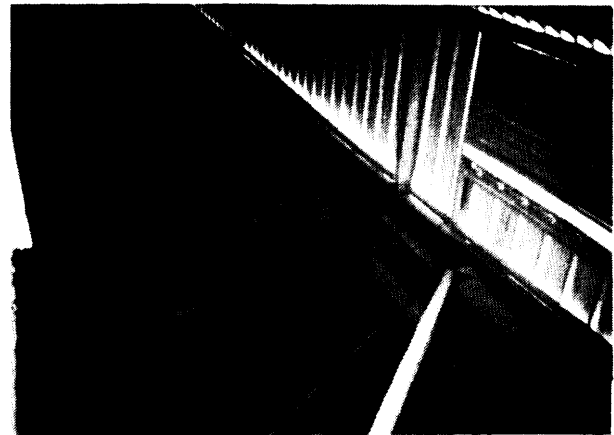


Photo credit OTA France Study Team

France uses a unique storage facility that consists of numerous vertical bins that are filled by along conveyor running under the length of the roof.

³Observations in this section are based on a tour by the OTA study team of selected facilities throughout north and west France.

Table 3-7.— Technical Characteristics of Country and Terminal Elevators in France, 1985 and 1986

Characteristics	Country elevator				Terminal elevator			
	Cooperatives		Private merchants		Marketing center locations	Port elevators		Total
	Total ^a		Sea			River		
	1985	1986	1985	1986		1985	1986	
Number	4,841	4,900	2,630	2,578	109	34	11	342
Average storage capacity (MT)	3,835	4,381	2,268	2,535	12,526	26,830	33,172	19,728
Modal shipping facilities (%):								
Rail	22	22	13	13	49	96	71	63
Barge/ship	6	5	2	2	14	100	100	49
(MT/hr):								
Average modal	71	77	62	63	149	213	165	176
Rail	84	108	25	100	127	547	201	302
Barge	66	75	43	46	95	271	131	127
Truck								
Elevator equipment:								
Percent with dryers	30	30	31	32	17	13	34	20
Average drying capacity (points/hr)	227	1,344	991	1,027	484	3,350	2,078	1,869
Percent with ventilation	76	76	73	75	64	65	82	69
Average cleaning capacity (MT/hr) ^b	—	30	—	27	—	—	101	—
								73

^aTotal includes "elevators in common," others in addition to cooperatives and private merchants.

^bAssuming every elevator has a cleaner.

SOURCE: 1985 data as of Jan. 1, 1985 from USDA, FAS, Attache Report FR-5084 (Paris: American Embassy, 1985); 1986 data as of August 1986 from Eurostat, "Evolution des Capacities de le Stockage," Office National Interprofessionnel des Cereales, Paris, November 1986.

Drying

Wheat as well as corn in France are harvested at moisture levels above that normally experienced in the United States. Until 1987, French wheat has had a base moisture of 16 percent in intervention standards. This base then carried into the market channel. A reduction of intervention moisture level has required that wheat be dried to 15 or 14.5 percent. All the firms interviewed by the study team insisted that 16-percent moisture could be safely stored, with the change in intervention base, pricing and discounts also changed. Regardless of intervention moisture, most wheat is apparently harvested below 15-percent moisture in normal seasons. In some regions and in some years weather prevents drying in the field and some wheat is dried at the elevator. Since essentially all wheat is stored off the farm following harvest, drying takes place at the first handler or shortly after delivery into the market channel. Based on study team interviews, drying of wheat is relatively infrequent.

Corn in France is harvested at much higher moisture levels than in the United States. Shrink tables, for example, go up to 50-percent moisture content. Moisture levels reported by producers and elevators indicate that 30 percent is not unusual for corn harvested as shelled corn. This means high-temperature dryers are essential. In some regions shelled corn is stored on the farm. One of the farms visited by the study team had a form of batch-in-bin dryer with an oil-fired burner.

High-temperature dryers at the elevator are similar to those used in the United States. The study team also encountered elevator managers who, because of concern for breakage, were using two-stage drying or aeration for removing the final points of moisture. Much of the corn in the Loire Valley has been harvested on the ear and stored in long, very narrow cribs. Under these circumstances, drying takes place through natural aeration. However, grain handlers in the region reported problems with mold and aflatoxin from corn stored in this manner. The heavier grain production region farther south is apparently harvesting with combines,

and ear cribs are not in general use outside of this one region.

Cleaning

Throughout the market channel, impurities and broken kernels appear to be of minor concern, especially for wheat. The study team was repeatedly told that farmers deliver clean grain (below 0.5-percent impurities) and that cleaning is seldom necessary to meet export or intervention limits. Millers, however, have more stringent requirements and a variety of responses. Some country elevators clean every load as it is delivered from the farm and reclean again as the grain is being loaded out of storage for delivery to millers.

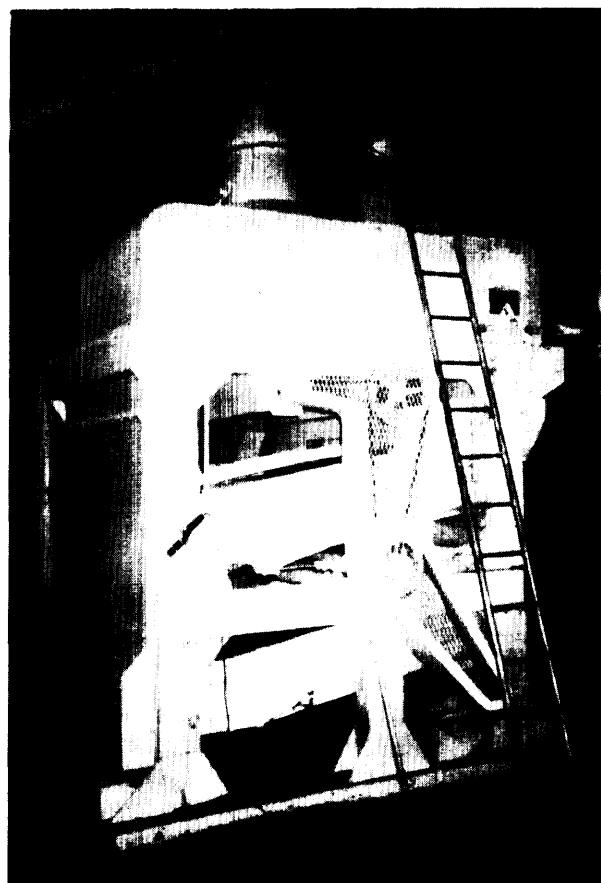


Photo credit: OTA France Study Team

Cleaners, as shown here, are found at every mill and country elevator. It is not uncommon for country elevators to clean every load of wheat as it is delivered from the farm and reclean again as it is being loaded out of storage—especially for delivery to millers.

However, at least one miller indicated to the study team that country elevators did not properly clean their grain and that it was necessary to reclean at the mill. The team in fact observed cleaners at one mill removing significant quantities of stones, straw, and other impurities. It was not clear if the same type of cleaners and scalpings were being used at both locations or if the mill cleaning was a more refined form of removing all of the nonmillable materials to a level below that delivered from the country elevators.

Cleaners are present at every mill and country elevator. The study team occasionally found cleaners at export elevators but saw little evidence that they were used except for extraordinary and very unusual situations. Producers are paid net of the screenings, which is reflected in the final payments. Primary incentives for cleaning at the country elevator level include contracts that specify a maximum 2-percent impurities, a desire to reduce storage problems, resale of screenings, and the general expectations of millers that wheat would be clean even though the contract limits may be loose.

Infestation

Insects are seldom a problem. Grain is checked for insects throughout the marketing system; when insects are found the grain is immediately fumigated. Some elevators treat with a contact insecticide as the grain is placed into bins. Empty bins are treated before placing grain into them.

● hdbg

The variety of wheat is extremely important to the French wheat industry, especially at farms, country elevators, and flour millers. When it comes off the farm, wheat is placed in bins by groups of varieties according to milling yield and baking characteristics—good, average, feed wheat, etc. Although some blending of different qualities does occur on wheat moving to export channels in France, there does not seem to be the desire or necessity to blend wide margins of different qualities.

Pricing and Commercial Trading

Several aspects of the grain marketing system in France have significant impacts on the commercial operation of the grain trading system. First, there are no “official” standards with factor limits and grades in France. EC standards, as described earlier, are for intervention purposes only. At least in the past only a very small proportion of the wheat went into intervention and EC standards consequently had little direct impact. However, they do have an indirect impact because they prescribe the characteristics that are measured, some of which reflect end-use value. These have been adopted in part or in whole in commercial transactions.

Second, variety plays a key role in some transactions. It is not uncommon for variety to be specified in contracts, and in some cases certain varieties are excluded. A third important component is the lack of an “official” inspection agency (i.e., like the U.S. Federal Grain Inspection Service). Private surveying companies compete to provide this service. Where appropriate, the contract appoints the surveying company. In general, quality is specified as per private contracts and negotiations, with terms varying across transactions. Quality limits and delegation of surveying/inspection companies are negotiable terms of a commercial transaction. When survey/inspection agencies are not required (e.g., in flour mills), then the long-term commercial relationship between participants assures the integrity of the system.

Grain trading is facilitated in part through the use of the “Paris Contract.” This prescribes standardization to grain trades and provides integrity through arbitration. It provides standardized terms regarding delivery, quality, etc. The Paris Contract therefore is used extensively for hedging purposes, with trades being as far as 9 months in advance. In addition, the contract is used for procurement purposes in some cases, such as by exporters. However, for others such as flour millers, greater specificity is needed and the contract is not used for procurement, though it maybe used for hedging. The contract has specific quality requirements, typi-

cally: specific weight, 76 kg/hi; 15-percent moisture, 4-percent broken, 2-percent impurities, and 2-percent sprout. For comparison, these are greater than those required for EC intervention.

In addition, addendums for feed and milling wheat contain provisions for slight deviations in quality. Specific premiums and discounts are established in this contract for deviations in quality and for the exclusion of varieties. The deviations are the limits beyond which the merchandise can be rejected.

Premiums and discounts play an important role in valuation of particular lots of grain as well as in the allocation across end-users. These exist throughout the marketing system in France and are established by market pressures. Two mechanisms influence actual premiums and discounts. One is the associated factor

limits that exist in the intervention price mechanism described earlier. These are fixed for each market year by the European Commission and apply only to grain entering intervention.

The Paris contract also establishes premiums and discounts and associated limits. Table 3-8 shows the discounts and allowable limits for both feed and milling wheat. For each factor, tolerances from the contract specification and a maximum deviation are given. At that level the buyer has the right to reject and/or the contract is settled by arbitrage. In several cases the discount rate increases for higher levels of deviation (e.g., moisture, impurities). In the milling wheat contract varieties can either be specified, or excluded, and different tolerances apply. Evaluation is based on 50-grain samples. For example, in a specified variety contract of 80 percent of one or more varieties then 40

Table 3-8.—Price Adjustments in the Paris Contract for Feed and Milling Wheat^a

Factor	Discount rate ^{b c} (percent)	Unit	Maximum deviations before arbitrage
Test weight:			
Feed	1	1 kg/hl	3 kg
Milling	1	1 kg/hl	2 kg
Moisture	1	first 1 0/0	
	1-1/2	second %	20/0
Broken	1/4	per point	30/0
Sprouted	1/2	per point	3 %
Impurities	1	per point 1-20/0	
	2	per point 2-4%	4 %
Hagber ^d	1/1000	per second	15 seconds
Protein ^d	0	0.0-0 .290/0	
	1.2	0.30	
	1.6	0.40	
	2.0	0.50	50 %
Zeleny ^d	0	1	
	0	2	
	1.2	3	
	1.6	4	
	2.0	5	60/0
Variety: ^{d e}			
Specified ^f	0	0-2 grains of 50	
	1/2	3 grains of 50	
	1	4 grains of 50	
	1-1/2	5 grains of 50	5
Excluded	0	0-2 grains of 50	
	1/2	3 grains of 50	3

^aUnless indicated otherwise price adjustments are the same for milling and feed wheat

^bAdjustments are made to pre-tax prices.

^cProrated per 1/10 percent.

^dApply to milling wheat only.

^eBased on samples of 50 grains and using electrophoresis.

^fVarieties in contracts are either specified, or excluded.

SOURCE: Office of Technology Assessment, 1989.

grains out of 50 would have to conform and with discounts as follows:

38-39 grains out of 50 = no discount

37 grains out of 50 = $\frac{1}{2}$ percent

36 grains out of 50 = 1 percent

35 grains out of 50 = $1\frac{1}{2}$ percent

Samples with less than 34 grains of the specified varieties could be refused or settled by arbitrage.

All of these discounts are expressed as a percentage of price. A recent example is that despite the abnormally large supply of sprouted wheat in the 1987 crop, the trade decided not to increase the discount but rather allowed it to be reflected in flat prices. An interprofessional committee meets periodically to review these discounts but, in general, they have not changed appreciably in percentage terms. These discounts apply to all grain delivered subject to the terms of the Paris Contract. Consequently, at least in principal, the discount rate does not vary across regions in response to locational supply and demand conditions, but the actual amount discounted varies depending on the quality characteristics of a particular lot.

As noted, variety is often a contract term, used as a proxy for end-use quality. In practice contracts may specify either an individual variety, a category of varieties, or excluded varieties. Given that varieties are in general not usually distinguishable, various mechanisms (described below) are used to assure the integrity of variety specification. Premiums and discounts exist in commercial transactions for specific varieties.

Producers have three basic alternatives for pricing. The dominant form is referred to as "Account Pricing," which essentially is a pooling mechanism by individual cooperatives. About two-thirds of the wheat is purchased by

first handlers using this approach. Producers receive about 90 percent of the expected total price at the time of sale. The dominance of account pricing is due to the predominance of cooperatives in originating grain, and the cooperative by definition is selling for the account of the producer. The second alternative is total payment at the point of delivery. About 30 percent of the transactions use this mechanism. The third alternative is delayed pricing, used in only about 3 percent of the transactions. In one case seen by the study team, storage charges were not used because of the monthly increments in the intervention price. In another case, farmers were free to sell under a quoted delayed price, and storage was provided by the elevator with charges to the producer, giving farmers the option of selling out of elevator storage at the time of their choice.

Several procedures/mechanisms are used at the country elevator level to verify the variety. First, in most cases the cooperative has sold seed to the producer, thereby knowing its variety. Sales of certified seed ranged from 40 to 50 percent in one region to 80 percent in another. Second, producers must declare the variety at the time of first sale on the "Acce" certificate. These certificates were originally implemented for tax purposes but also serve this important additional purpose. Penalties exist for incorrectly stating the variety. Third, cooperatives can evaluate questionable lots by a fairly rudimentary acid procedure, or by requesting an electrophoresis from a laboratory. However, normally these are not required, given the above. By knowing the varieties at the time of receipt, country elevators can bin by varieties or by categories, and sell on the basis of varieties. In general these mechanisms are adequate for assuring variety at the point of first sale.

VARIETY DEVELOPMENT AND RELEASE

Earlier in this chapter, it was demonstrated that productivity growth in France has exceeded that of all other exporting countries with no sacrifice in quality. In fact, quality has im-

proved along several dimensions. And the previous section indicated that the French marketing system places tremendous emphasis on the variety, or categories of varieties, as indica-

tive of end-use quality. France has a rigid system for the development and release of varieties. This operates through a catalog of official varieties that is a prerequisite to production and marketing of seeds. Certain criteria have to be met for a variety to be considered, including both agronomic and end-use quality.

Two Government agencies, under the authority of the French Minister of Agriculture, control the release of new varieties and the production and distribution of seed for wheat, corn, soybeans, and others. Groupement National Interprofessionnel des Semences et Plants (GNIS) controls the production and distribution of certified seed, regulating many of the same factors used in seed laws in the United States—purity, germination, accurate labeling, etc. The regulations are promulgated and enforced by various departments in GNIS. Their authority extends to the contracts between seed companies and growers.

Control of new varieties is achieved through the Comité Technique Permanent de la Sélection des Plantes Cultivées (CTPS), composed of representatives of plant breeders (in fact every breeder is automatically invited to designate a representative), producers, millers, and other users. There are 55 to 60 members on this committee, evaluating every potential new variety. CTPS sets the criteria, establishes the tests, evaluates the results, and recommends to the Minister of Agriculture those varieties to be registered in the official French catalog.

A third agency indirectly involved is the Institut Techniques des Céréales et de Fourrages. ITCF was created in 1959 as an association between the Farmers Union and the Cereal Producers and Cooperatives and is financed by a tax of 3.7 francs/MT on cereals. It has responsibility for research and extension and is working primarily for the benefit of producers and their cooperatives. Most of the responsibility for testing and quality evaluation resides with ITCF, but other research agencies and laboratories—private and public—also provide test facilities.

The annual catalog of varieties (Catalogue Officiel des Espèces et Variétés) lists all the

varieties of a particular crop that are licensed. A variety can only be produced and marketed legally after it is registered and listed in this catalog. All varieties are subject to automatic removal from the catalog 10 years after registration. A variety may also be removed at any time if problems arise. The catalog is a licensing mechanism, but it is also the market mechanism, subject to the catalog restriction, that determines what is produced. In 1986, for example, the top three varieties (Festival, Fidel, and Camp Remy) were seeded on 45 percent of the area planted.

In general, CTPS considers both agronomic and quality factors. However, before a variety is accepted for testing it must meet three general criteria:

- **Distinguishable**—The variety or line must differ from other known varieties on at least one important morphological or physiological characteristic. In the case of wheat protein, chemistry is evaluated through electrophoresis to establish a unique pattern that is used as a “fingerprint” for that variety, even in commercial sales where variety is specified.
- **Homogeneity**—A variety or line is considered homogeneous if the tested plants reproduce the same genetic characteristics as other plants selected from the same variety or line. In the case of wheat, 200 seeds are planted and no more than two plants may be differentiated by physiological or morphological characteristics. A bulk seed test is also required in which fewer than three plants in 1,000 maybe differentiable.
- **Stability**—A line is considered stable if successive generations conform to the original essential characteristics.

CTPS has developed a system of grading candidates for the catalog that allows for a trade-off between yield, agronomic characteristics, and end-use quality. Basically each new variety must prove superior to existing varieties in either quality or productivity to obtain approval. This is achieved by selecting a “witness” variety in each region to serve as the standard against which the new variety is measured. The

witness variety is generally the most popular one planted by farmers. In the case of wheat, a tableau exists with yield v. quality in a two-way matrix with a quantitative scale. Any new variety must equal the yield of the witness and be equal to the average yield of all new varieties under test. The tableau differentiates between bread quality wheat and feed quality wheat. Additional points may be garnered for insect and disease resistance. As an example, the quality parameter is "W" from the alveograph (a measure of strength) and comparisons are made to Capitole, a variety released in 1964 and reinstated in 1984. (The zeleny test was used previously and abandoned; however, the EC has since incorporated Z into the intervention mechanisms, thereby making the Z score more important). If a variety being tested has a W equal to 90 percent of Capitole, then the yield would have to be between 97 and 106 percent of that of Capitole, depending on other agronomic characteristics. These are fairly formal and rigid mechanisms and all breeders are aware of the tableau.

In the case of corn (and feed wheat), the primary criterion is yield. Other agronomic considerations include rate of maturity, resistance

to lodging, tolerance to cold at planting time, and susceptibility to insects and disease. As with wheat, there is a numerical scale of points. Each variety is given a score between 0 and 5 for resistance to diseases and insects, with zero being very susceptible. Although end-use quality is less important in registering corn than in registering wheat and although the tests are less extensive, quality corn generates a maximum of 10 points on the registration scorecard. The points for quality are assigned by CTPS, on the basis of type (white corn gets an automatic 5 points; waxy and opaque, 10), protein, and oil. The minimum oil content for garnering points is 10 percent, 4 to 8 points above traditional commercial varieties.

The time required for testing, approval, and distribution of new varieties has been shortened by many breeders, who gamble on approval and multiply the seeds while the tests are under way. GNIS estimated 7 years between identification of a new line and commercial distribution of the variety. A commercial breeder estimated a minimum of 4 to 5 years but with an additional 4 years of research preceding the identification of the new line.

QUALITY CONTROL IN FRANCE

Four important features of the French marketing system have an overriding impact on the organization of the system for grading and inspection, some of which were discussed earlier. First, no official standards establish standardized numerical grades; EC standards are only used for intervention purposes. Private contracts for trading purposes have evolved and in a sense provide standards for trading. (ONIC tried to implement official standards with numerical grades during the early 1980s but abandoned the effort due to nonuse.) Second, the private contracts specify important factor limits and premiums and discounts for deviations (however, the penalties are substantial). In addition, variety (or sometimes excluded varieties) is a contract term. Third, no official agency is responsible for sampling and inspection; private surveying companies play this role. Fourth, throughout the marketing system the great em-

phasis on commercial relationships and competitive pressures assures the integrity of the system.

Throughout the system a number of factors are measured, depending on the terms of the contract (table 3-9). Samples are obtained by various methods, from hand-dipping to mechanical diverter samples, depending on location and who is obtaining them. Portion sizes for analysis are reduced to a workable size by different methods. Sample dividers such as the boerner are seldom used. More often than not the samples are handmixed and hand-dipped from a container. The final portion analyzed is hand-adjusted to obtain the exact portion size desired.

Producer deliveries are sampled and inspected when they arrive at the first receiving elevator. Every truckload is inspected by ele-

Table 3-9.—French Grading Procedures

Factor	Measure	Procedure
Test weight	kg/hl	Kilograms per hectoliter determined (in most cases) by use of Dickey John Grain Analyzer (GACII)
Moisture	110°/o	Determined (in most cases) by use of the Dickey John Grain Analyzer (GACII)
Extraneous matter	1/10%	Sieve 100 grams (in some cases, two separate 50-gram portions) over a 1-mm sieve. All material passing through is extraneous. This becomes a component of the factor impurities (see below).
Broken kernels	1/10%	From the above sieved sample, remove all broken kernels. This includes all kernels of which the endosperm is partially uncovered and from which the germ has been removed.
Sprouted kernels	1/10%	From the above sieved sample, remove all sprouted kernels (the line on sprout is similar to U.S. line).
Miscellaneous impurities	1/10%	Includes material that passes through the 1-mm sieve plus weed seeds, husks, chaff, straw, sand stones, etc. (foreign material and dockage combined in U.S. standards) and damaged kernels such as mold, heat damaged, smutty, etc.
Grain impurities	1/10%	Includes shrieved kernels of the above 100-gram sample that passes through a 2-mm (5/64) X 20-mm sieve, plus kernels that are frost-damaged, green-damaged, insect-damaged, sick-damaged, other grains, and all material included from miscellaneous impurities above.

SOURCE: Office of Technology Assessment, 1989.

vator personnel. Samples are obtained in a variety of ways, from a mechanical trier to a quart container that is used to obtain the grain as it flows from the truck to the dump pit. Almost all producer grain is sampled and inspected by elevator employees. Each inbound truck or trailer is checked for test weight and moisture. Broken kernels, impurities, and sprouted kernels are also examined, but this varies some, depending on the elevator and the overall quality of the crop. Some elevators run a falling numbers test rather than pick for sprouted ker-



Photo credit: OTA France Study Team

Sampling equipment differs markedly among local elevators. Some utilize a primitive type pan or bucket at the endgate. Others have hydraulic vacuum probes as shown here.

nels. Producers must also declare the variety of wheat. Each load delivered must be accompanied by a document that declares the owner, weight, taxes, variety of wheat, and other identification and quality information.

Wheat is binned at the country elevator by varieties representing milling yield and baking characteristics. Some elevators will turn and sample the grain from each bin in order to run various end-use tests that were too technical and too time-consuming to conduct at the time of harvest. This is sometimes done in conjunction with the millers, who are searching for good-quality milling wheat. Other elevators maintain composite samples of all the grain placed into each bin, which may be used for analysis. Either way, the elevator operator has a good idea about the physical and chemical qualities of the wheat in each bin.

Generally, grain moving to mills is not sampled or inspected because the mills request specific wheat varieties that have undergone chemical tests and that meet the desired baking requirements. Grain moving to export channels is either sampled and inspected at the shipping point or at the receiving elevator by a surveying company, depending on terms of the contract. Grain shipped to elevators must meet the quality specified in the export contract. Grain



Photo credit: OTA France Study Team

Computers are used at many local elevators to assemble data on every quality factor tested on each truckload of grain.

not meeting specified export contracts may be rejected by the surveying company or receiving elevator,

No Government agency exercises authority over quality or quantity of grain as it moves through market channels. The only agency that may influence quantity or quality is the Service des Instruments de Service (weights and measures). It tests all inspection and weighing equipment annually for accuracy. This includes grain industry and surveying company equipment and instruments.

Private surveying companies such as SGS and Thionville provide the closest thing to uniform inspection. They check all grain moving in export channels and, at the request of the interested parties, provide inspection at interior locations in France. SGS handles by far the largest percentage of inspection, but other surveyors may be used depending on terms of the contract.

Inspection procedures vary considerably throughout the marketing system, as can be ex-

pected when no supervising body insures uniformity. Surveyors have tremendous control of overall export shipments, including weighing, sampling, and inspecting the grain and running chemical analyses required in the contract. They have authority to stop loading when grain does not meet the quality specified by the contract. Controls to stop loading are located next to the sampling station in order to immediately halt operation if "off contract" grain is running. Exporters deliver as close to the contract quality limits as the surveying company permits. SGS issues certificates and, depending on terms of contract, may accept responsibility for quality and quantity at destination.

Wheat variety is extremely important to the wheat millers in their effort to process good baking-quality flour. Millers often go directly to the country elevator and test wheat. Electrophoresis is commonly used for testing varieties. Mills request a specific wheat quality in their contract. If the wheat does not meet the desired specifications when it arrives at the mill it is sent back to the shipper. The normal contract specifies the following quality factors: test weight 76 kg/hl, 40-percent broken kernels, and 2.0-percent sprouted, which are the same as the Paris Contract. There are very few problems with biological defects such as mold, sick wheat, and soon in French wheat, but sprouted kernels are a problem. The French millers use



Photo credit: OTA France Study Team

Wheat variety is a very important indicator of quality. Farmers must declare the variety of wheat delivered to the local elevator. One method of verifying the variety is electrophoresis technology which can identify the exact molecular structure of the grain.

infrared reflectance to test moisture, protein, starch, ash, etc.

Export flour in France moves much faster from mill to vessel than it does in the United States. Seldom is flour placed in storage in France. It moves direct from the mill to the vessel and is almost always aboard the vessel within 2 weeks of milling. (U.S. flour is usually placed in storage at the port waiting for

a vessel often for up to 30 days or more.) The French seldom if ever have insect problems. French millers fumigate the mill one to three times per year for insect infestation. In France, sacked flour is transported from the mill to the port in open-top boxcars covered with tarpaulins. It is placed in slings and when it arrives at the port the contents of the entire car is slung from the rail car to the vessel.

FINDINGS AND CONCLUSIONS

The wheat produced in France is a winter-planted soft wheat. The quality is generally a lower protein, medium-strength wheat and the end-use performance is somewhere between U.S. soft and hard winter wheat. Yield growth of wheat in France and the EC has exceeded that of other exporters. Yet the quality of recent wheat crops has exceeded the long-term average. This indicates that yield growth has occurred without sacrifices in crop quality.

A major reason for no sacrifice in wheat quality while yields have increased is the variety development and release program. Release of varieties is subject to approval by the Government. Formally, a committee makes recommendations to the French Minister of Agriculture, who in turn licenses a variety. Criteria for release include both agronomic and quality factors. And a trade-off between a measure of end-use performance and yield is included in the criteria.

The principal agricultural policy in the EC is the Common Agricultural Policy, which includes the intervention price as the key instrument affecting producer prices and quality differentials. No official grade standards exists in the EC and it is the criteria for intervention that largely are adopted as minimum standards for the market. The intervention price includes premiums and discounts for quality factors and differences in end-use performance criteria be-

tween feed, bread, and quality wheat. Several actions have been taken in recent years to reduce the effectiveness of the 1P. One has been to tighten the quality requirements to be eligible for nonfeed intervention prices. Despite these efforts, it does not appear that quality has improved.

One important characteristic of the French marketing system is limited on-farm storage. And only a relatively small proportion of wheat production is stored between crop years, thereby minimizing problems associated with inter-year storage. A large proportion of grain is delivered to the marketing system at harvest. As a general rule, conditioning of grain (drying, cleaning, and treating insects) is done at the first point of sale. Wheat is generally clean at the farm level due to good weed control and proper combine adjustment. However, all elevators have cleaners and it is a common practice to clean the grain as it is received, as well as while loading out. Incentives to do so include contract requirements, resale of screenings, and a desire to reduce storage problems.

Variety plays an important role in marketing French wheat. It is used because the end-use performance of each variety is known, and direct measures of end-use performance are not very expeditious. In practice, transactions specify a particular variety, categories of varieties, or excluded varieties.

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