

Europe's contribution to world food supplies

by Sylvia Brewda

European agriculture has become a significant factor in the world's food supply since World War II. To the extent that significant increases in productivity have occurred, this has been the result of the application of advanced technology to the farms of Europe. The failure to sustain such capital-intensive development is at the heart of the crisis facing European food production today.

Figure 5 shows the world acreage and production of grain from 1950 to 1980. Europe doubled its per-capita production of grain, while world production rose by only 27 percent. Between 1965 and 1980, European grain production per capita rose from close to the world average to one-and-a-half times that level, allowing for significant exports. European grain yields per acre in 1980 were the highest in the world, a

position achieved only in the last decade. This reflects in part the labor-intensive small farms which are still common in Europe, where each acre of cropland receives more than five times as much labor input as in the United States (Figure 6). But the mere application of more man-hours does not result in such progress, as indicated by the figures for Asia, where labor-intensive farming predominates.

Europe's productivity levels are highest within the European Community (EC). Figure 7 shows a more detailed view of the grain producing areas of the world, and highlights the difference between the countries which have been under the EC's Common Agricultural Policy and those which have been operating outside this framework, as well as indicating the differences between Eastern and Western Europe.

The rise in EC productivity levels involved increased mechanization and other key production inputs. In 1980, for example, the major grain-producing countries—West Germany, the United Kingdom, and France—had 1.8, 2.1 and 1.3 tractors per farm respectively, while American farms had an average of 2. The tractors per acre for the EC countries increased by close to 50 percent over the decade from 1970 to 1980. Figure 8 shows that the EC farms are relatively tiny by U.S. standards, but there has been significant growth in the average farm size over the last 20 years. This is particularly true of the countries shown. Italy, in contrast, had an average farm size under 20 acres in 1980, less than a 10 percent increase over the 1960 average.

Figure 9 analyzes the output and yield of wheat, allowing a comparison of the EC with major producers elsewhere. The yield per acre of the United Kingdom is the highest and the three large EC producers have yields more than double that of the United States. Much of the large United States wheat

Figure 5
World grain acreage and production

	Total Grain Acreage (Millions)	Yield per Acre (Bushels)	Grain per Capita (Bushels)
North America			
1950	249	26	39
1965	198	40	38
1980	224	56	49
Latin America			
1950	70	18	8
1965	100	21	8
1980	123	29	10
Europe			
1950	185	24	11
1965	181	35	14
1980	174	59	22
Africa			
1950	120	11	6
1965	141	15	7
1980	180	16	6
Asia			
1950	871	15	9
1965	1,023	20	10
1980	1,156	28	11
Oceania			
1950	15	18	22
1965	23	20	27
1980	39	18	30
WORLD			
1950	1,509	18	11
1965	1,665	23	12
1980	1,794	35	14

Source: U.N. F.A.O. Production Yearbook, 1971, 1981

Figure 6
Labor intensity per acre farmed
(for cereal crops, 1975)
manhours/acre/year

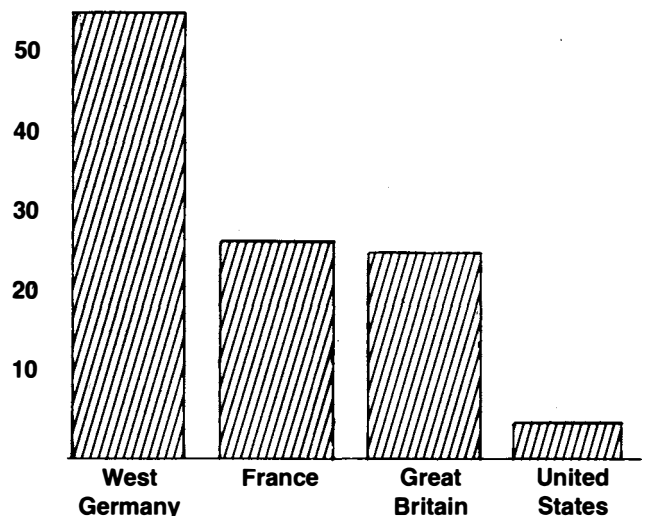


Figure 7
World agricultural acreage and grain output by region, 1980

Region	Tot. Ag. Land Avail. (Millions of Acres)	Tot. Acreage in Prod. (Millions of Acres)	Tot. Acreage in Prod. of Grain (Millions of Acres)	Yield per Acre for Grain (Bu/Acre)	Workforce in Ag.	Workforce in Grain	Yield of Grain (Bu/Man-Year)	Grain Output of Region (per Capita)
U.S.A. and Canada	2,734	1,225	224	56	2,747,000	1,373,000	9,059	49
European Community	317	250	71	71	8,393,000	4,197,000	1,200	19
Non-European Community, W. Europe	366	161	42	48	6,168,000	3,084,000	655	20
Eastern Europe and Soviet Siberia	4,030	1,647	362	29	38,402,000	26,881,000	393	28
Latin America	4,243	1,735	123	29	38,996,000	24,177,000	147	10
Africa	4,104	2,385	180	16	114,245,000	85,683,000	33	6
Middle East	691	575	67	24	20,549,000	17,467,000	92	12
Asian Subcontinent	903	693	324	23	217,355,000	195,619,000	39	8
Southeast Asia	823	226	108	35	83,649,000	75,284,000	51	10
Taiwan, Japan, South Korea	97	19	12	64	12,284,000	8,599,000	90	5
Oceania	1,640	1,266	39	18	2,108,000	1,476,000	467	30
China and North Korea	1,449	1,102	243	47	280,426,000	260,796,000	44	11
World	21,397	11,284	1,794	35	827,325,000	704,636,000	88	14

Source: U.N.F.A.O. Production Yearbook, 1981

NOTES:

Total land available consists of arable land, permanent cropland, pasture land, and forest.

55 pounds = 1 bushel

Workforce in grain based on estimates.

crop is grown extensively—sown over huge expanses of land, with minimum fertilization and no irrigation. Mexico also has higher yields than the United States, although its production of wheat is relatively tiny. The major wheat producers of the Third World, such as Argentina and India, have yields which are between 50 and 75 percent of those of the United States. Africa, which produces close to 10 million tons of wheat, operates with a yield of under 17 bushels per acre, approximately half that of the United States.

Figure 8
Average farm size

	1960	1970	1975	1980
West Germany				
Average acres/farm	23	29	34	37
Index of farm size	6	7	9	10
France				
Average acres/farm	42	52	60	63
Index of farm size	11	13	15	16
United Kingdom				
Average acres/farm	-na-	142	159	170
Index of farm size	-na-	36	41	31
United States				
Average acres/farm	288	389	427	450
Index of farm size	74	100	110	116

The greatest dependence of the world on the agricultural production of the EC is for the provision of animal protein by milk. Europe supplies more than 20 percent of all types of milk in the world. **Figure 10** gives the details of milk production in major areas of the world, along with per-capita production. The per-capita production in the EC is well above that of the United States, which shows the European capacity for export. The per-capita production of the EC has risen sharply over the past ten years, while per-capita production has decreased in many of the less advanced countries. Protein malnutrition is now endemic throughout Africa, which produces only 66 pounds of milk per capita—little more than 10 percent of the U.S. consumption rate.

The well-developed European dairy production infrastructure could be used to produce rates of milk output sufficient to transform health standards in many parts of the world. Powdered milk and other dairy products are the best foods to provide animal protein to rapidly combat malnutrition, since under rough distribution conditions, milk needs no cooking, and can be consumed in any form.

Dairy herds in Denmark and other EC dairy regions are already among the highest-producing anywhere. But through application of the computer herd management equipment available in Europe, which assesses each cow's exact food, medicine, and breeding requirements every day, output could be increased by 20 to 30 percent. With the additional appli-

cation of herd improvement through superovulation, milk production could be doubled within a couple years.

At the same time, the EC has the processing facilities for "long-life" milk, preserved through ultra-high pasteurization, which can be shipped and distributed without refrigeration. And there are facilities for food preservation through gamma radiation. These have not been developed to any degree in the United States.

Figure 11 shows the productivities of workers and land in various countries at different levels of development, demonstrating the relative technology-intensive character of Eu-

ropean farming. Development is indicated by electricity use, both per worker and per acre. West Germany possesses the most developed farm sector per acre, and the second-most-developed per worker, of those for which data were available. Although the values for France are rather low, they represent a doubling of electricity use in agriculture in the 1970-1980 period. These values are closely correlated with overall yields and productivities, and indicate that energy intensity in farming is just as crucial as in industrial processes. The ability to use such energy cannot be acquired overnight. Infrastructure for electricity itself, movement of fertilizer and fuel into

Figure 9
Production and yield of wheat, selected nations

	1960	1965	1970	1975	1980	1983
United Kingdom						
Production, thousand tons	3036	4171	4236	4489	8472	9860
Yield bu/acre	53.1	60.3	62.2	64.4	87.1	86.1
Index of yield	171	195	201	208	281	278
France						
Production, thousand tons	11010	14760	12922	15013	23683	24549
Yield bu/acre	37.5	48.4	51.1	57.4	76.6	75.1
Index of yield	121	156	165	185	247	242
West Germany						
Production, thousand tons	4965	4348	5662	7014	8156	8220
Yield bu/acre	52.8	45.6	56.3	66.7	72.4	75.7
Index of yield	170	147	182	215	234	244
United States						
Production, thousand tons	36955	35880	36861	57885	64745	64173
Yield bu/acre	26.1	26.4	31.0	30.6	33.4	40.1
Index of yield	84	85	100	99	108	129
Mexico						
Production, thousand tons	—	2278	3363	2785	—	—
Yield bu/acre	—	43.0	56.4	51.9	—	—
Index of yield	—	139	182	167	—	—
Turkey						
Production, thousand tons	—	11423	16578	16554	—	—
Yield bu/acre	—	19.4	26.4	27.2	—	—
Index of yield	—	63	85	88	—	—
Argentina						
Production, thousand tons	—	5873	11000	7780	—	—
Yield bu/acre	—	19.7	25.4	23.0	—	—
Index of yield	—	64	82	74	—	—
India						
Production, thousand tons	—	20859	28846	31830	—	—
Yield bu/acre	—	15.6	15.7	16.9	—	—
Index of yield	—	50	51	55	—	—
Brazil						
Production, thousand tons	—	1743	3215	2708	—	—
Yield bu/acre	—	13.9	13.5	12.9	—	—
Index of yield	—	45	44	42	—	—
African continent						
Production, thousand tons	—	7999	10218	8854	—	—
Yield bu/acre	—	14.4	16.2	16.3	—	—
Index of yield	—	46	52	53	—	—

Index is based on U.S. 1970 yield. The average quality of wheat in Europe is much lower than in the United States, since it is low in moisture content.

Figure 10
Milk production, selected nations

	1960	1965	1970	1975	1980	1983
Germany						
Total (thousand tons)	19250	21184	21856	21604	24778	26100
Per capita (lbs.)	754	790	792	769	885	
France						
Total (thousand tons)	22972	26780	22963	24855	26859	30900
Per capita (lbs.)	1123	1205	995	1037	1101	
United Kingdom						
Total (thousand tons)	12080	11980	12873	13909	15958	16750
Per capita (lbs.)	521	484	473	544	625	
EEC						
Total (thousand tons)	—	—	73251	99744	113199	105000
Per capita (lbs.)	—	—	640	849	953	
United States						
Total (thousand tons)	55959	56445	53185	52424	58420	—
Per capita (lbs.)	681	639	606	534	565	—
Turkey						
Total (thousand tons)	—	—	4308	4817	5334	—
Per capita (lbs.)	—	—	268	265	259	—
Mexico						
Total (thousand tons)	—	—	4104	5233	7182	—
Per capita (lbs.)	—	—	176	191	227	—
Brazil						
Total (thousand tons)	—	—	7386	10049	10289	—
Per capita (lbs.)	—	—	170	204	185	—
India						
Total (thousand tons)	—	—	21343	25875	30930	—
Per capita (lbs.)	—	—	85	92	99	—
African continent						
Total (thousand tons)	—	—	12450	12766	14093	—
Per capita (lbs.)	—	—	77	69	66	—

farms, and the storage and transport of their products, machinery and its servicing, as well the provision and use of high-quality seeds, have been built up in Europe since the devastation of two World Wars. These capabilities are not yet fully used, but they have already produced results.

France's agriculture under CAP

The Common Agricultural Policy (CAP), as designed by French President Charles de Gaulle, was a major force moving France's agriculture, as well as that of most other original members of the Common Market, into the 20th century. In 1950 France had only 140,000 tractors in use, and relied on over 2,500 draught animals. Wheat yield was 26 bushels per acre—less than the 1933 level during the Depression. Over five million people were involved in what could reasonably be described as "peasant agriculture."

By 1960, when the CAP was first instituted, the effect of guaranteed prices and support for investment had begun to be felt. Although there were 1 million fewer farm operatives, the area under cultivation had remained almost constant, and the yield of wheat had risen to 37 bushels per acre. Although there were still almost 1,900 draught animals, the number of

tractors had increased more than five-fold, as shown in **Figure 12**.

De Gaulle used the political base of the French farmers, and the power of the French nation, to maintain and increase the development of agriculture—in his own country and elsewhere in the Common Market. During the 1960s, the number of farm operatives dropped by almost half, and the average farm size increased by approximately 25 percent. Most notable was the rapid rise in the use of fertilizers, shown in **Figure 13**. Although total wheat production rose at a relatively slow rate of 17 percent, yield per acre rose at more than twice this speed. By 1974 French farmers were applying almost as much nitrogen and approximately half as much phosphorus and potassium as used by those in the United States.

Fertilizer-use trends also vividly show the downturn in the process of modernization after de Gaulle's death, and the depressing effect of the 1973 oil price shock. The U.S. Department of Agriculture's 1974 predictions for French fertilizer use trends indicate the trajectory which French agriculture was following up to that point—and which it failed to maintain.

Figure 11
International yield comparisons, 1978

	Yield per Worker (Tons/yr per ag wkr)	Yield per Area (Tons/yr per ag acre)	Electricity Intensity (kWh/yr per ag wkr) (kWh/yr per ag acre)	
United States	351.0	.73	17,574	36.4
West Germany	70.0	2.38	6,099	234.7
France	58.5	1.41	807	19.5
Brazil	24.9	.97	154	3.7
Italy	22.7	1.08	1,092	59.6
Soviet Union	21.2	.31	3,805	55.7
Turkey	4.7	.36	18	1.9
South Korea	3.8	2.92	34	33.7
India	1.4	.43	81	30.6

Source: USDA, OECD Energy Statistics, Congressional Hearings on USSR, Soviet statistics, Brazil Census, DoC Export Opportunities in Brazil, Bank of Korea Economic Statistics Yearbook, Tata Services Ltd. Statistical Outline of India

Notes:

Agricultural acres (ag acre) are the sum of arable land, permanent cropland, and pasture land.
In India, electricity for agriculture use refers to electricity for agricultural pumping. Yield is sum of all agricultural products.

By 1982 the head of the farmers' union could proudly announce that one French farmer could feed 30 people, while in 1962 he had only been able to feed 7. But at the same time, the impact of the fall in the real prices of farm products was already hitting hard. Farmers were being forced to cut back on equipment replacement, quality seed, and fertilizer inputs, and maintenance requirements of their livestock. Demonstrating farmers handed out leaflets which complained that a tractor which in 1970 cost the equivalent of 45,000 kilos of wheat, was costing them 70,000 kilos. The process of technological improvement which had led to the *real* cheapening of food prices for the entire nation was being rapidly reversed. The failure of the CAP to overcome this has brought about its crisis today.

Figure 12
Tractors in use

	1950	1960	1970	1975	1980
France					
Total*	140	743	1239	1363	1504
Number per farm	-na-	.42	1.15	1.13	1.33
United States					
Total*	3394	4685	4617	4434	4775
Number per farm	.63	1.26	1.69	1.78	1.97

*Thousands

Figure 13
Declining growth of fertilizer use in France

