Part 1: SOYBEANS

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Abstract

U.S. soybean production increased rapidly during the 1960's and 1970's and is second in production value only to corn. While the growth arose largely from export demand, the United States faces increasing competition for soybean exports. Soybean meal also competes with other protein meals for livestock feed, and soybean oil competes with substitutable fats and oils. Although soybeans are relatively free from direct Government programs, lower soybean prices and greater incentives to participate in Federal commodity programs for other crops have reduced soybean acreage and production during the 1980's. Soybean production areas shifted somewhat during the 1980's as well. Soybeans are supported by a price support loan which, in most years, has been below prices received by farmers. Issues for legislation in 1990 will probably include crop substitution on program crop acreage bases, the support level, trade, and a marketing loan for soybeans.

Summary

Growth in the U.S. soybean industry halted during the 1980's primarily because of increased competition from South American and other foreign oilseed producers, sluggish economic growth in many soybean importing countries, and U.S. commodity programs for grains and upland cotton. Interest rates, the value of the dollar, and trade policies in the United States and other countries also affect foreign demand for U.S. soybeans and, hence, soybean production.

Government programs, weather, and trade policies affect the soybean industry. What is Government's role in trying to temper price and income fluctuations? Nonrecourse loans are the primary Government program for soybeans. The loan rate generally has been set below the average price received by farmers. The soybean loan is used by farmers primarily to obtain operating funds at harvest time.

Policy questions relating to soybeans in the 1990 farm legislation will include the support level, the efficiency of a marketing loan program for soybeans, and production and export incentives. The Government can be subject to large outlays under these programs if soybean prices fall below the loan rate.

Domestic soybean policy issues to be addressed will include:

(1) Continuation of nonrecourse price support loans.

(2) Establishment of the loan rate formula.

(3) Establishment of a minimum loan rate.

(4) A marketing loan for soybeans.

(5) Production incentives to allow soybeans to compete with corn, cotton, and other basic commodities.

Foreign trade policy issues are of particular concern to the soybean industry:

(1) Trade liberalization.

(2) Export expansion programs.

(3) Funding of export credit programs.

(4) Cargo preference for U.S. ships.

(5) Strength of the U.S. dollar and exchange rate adjustments by other exporters.

(6) Need for countervailing programs to offset foreign export subsidies.

(7) Import levies and other restrictions in the EC.

(8) EC changes in feed grain policy.

(9) Other foreign import restrictions.

U.S. soybean production in the 1990's and beyond will reflect the resolution of these issues in ongoing trade talks and U.S. farm legislation

Introduction

The soybean industry is one of the world's fastest growing agricultural sectors. Domestic production increased over 300 percent during the last 25 years, but foreign production rose 550 percent. Soybeans accounted for half of the world production of major oilseeds in 1984/85-1988/89. With an estimated farm value of $11.4 billion in 1988/89, soybeans are second only to corn in production value in the United States. The demand for soybeans is derived from the demand for the joint products of meal and oil. Much of the growth in U.S. soybean use has come from export demand. Soybean and soybean product exports averaged $6.2 billion per year in FY 1984-88 (Davison).

The importance of soybeans in the United States declined during the 1980's, however. U.S. dominance of world exports eroded as well. Soybean acreage dropped about 20 percent between 1979 (71.4 million acres) and 1987 (58.0 million acres). Production declined by a smaller percentage because of higher average yields. The loss of U.S. market share was due to competition from South American oilseed production, increased foreign production of vegetable oils, domestic commodity policy, and both domestic and foreign trade policies.

The downward trend in U.S. soybean acreage reversed in 1988. Continued short supplies, high prices, and production incentive provisions in the Disaster Assistance Act of 1988 contributed to an expansion in 1989 soybean production, with planted acreage reaching 60.5 million acres. Renewed growth in the U.S. soybean industry is possible if foreign demand continues to grow. The future of the foreign market is vital to the U.S. soybean industry.

Structure and Performance of the Soybean Industry

Production Characteristics

The number and size of U.S. soybean farms varies among farm production regions. Farms with fewer than 100 harvested acres of soybeans accounted for about 61 percent of the 441,899 soybean farms in 1987, ranging from 37 percent of the farms in the Delta to 77 percent of the farms in the Northeast (table 1). The proportion of farms with 250 or more acres of soybeans was largest in the Delta. The average harvested soybean acreage per farm increased from 114 acres to 125 acres from 1978 to 1987.

Soybeans comprised almost one-fifth of the 313 million acres of principal crops in 1988. Other major crops in 1988, each comprising about one-fifth of cropland acreage, included corn, wheat, and all hay (harvested acreage). Soybeans accounted for over 86 percent of U.S. oilseeds production in 1984/85-1988/89, far surpassing cottonseed (8 percent), peanuts (3 percent), sunflower (2 percent), and minor flaxseed production.

Almost 68 percent of U.S. soybean farmers received half or more of their total sales of agricultural products from cash grains in 1987. The percentage increased as soybean acres per farm rose: 55 percent on farms with 1-24 harvested soybean acres, 66 percent for 25-99 acres, 75 percent for 100-499 acres, and 83 percent on farms with 500 or more acres. The distribution of soybean farms by value of sales varies across regions (appendix table 1).

Soybean Yields

U.S. soybean yields have trended upward during the last 35 years, increasing by about 12 bushels per acre harvested (table 2). This is a much smaller percentage gain than the 70-plus bushel increase in corn yields during the same period. However, soybeans have remained competitive with corn because of strong demand for soybean products and because production costs have not increased as much as those for corn.

Improved varieties and management practices have raised yields, but limited knowledge about the genetic structure of soybeans has delayed development of high-yielding varieties. Genetic engineering techniques such as tissue culture have proven successful for tree crops, especially oil palms, while the application to oilseeds has been lagging, according to Lowell Owens, Agricultural Research Service, USDA.

Major yield gains are not anticipated anytime soon. A slow upward trend in yields is expected to continue because of varietal improvements and improved production practices. Yield increases may be tempered by efforts to reduce inputs and costs. Yields of double-cropped soybeans have traditionally been lower than single-cropped beans, but increasing irrigation of double-cropped soybeans has narrowed this difference.

Regional Production Differences

Factors which account for shifts in production areas include regional differences in: (1) relative profitability of competing crops, (2) climate, (3) resource endowments, and (4) production practices, such as irrigating and double-cropping soybeans and wheat in the South.

Table 1—Distribution of soybean farms, by acres of soybeans harvested, 1987

Region	Farms by acres of soybeans harvested							Farms growing soybeans
	1–24	25–49	50–99	100–249	250–499	500–999	1,000 or more	
	Percent [1]							*Number*
Corn Belt	19.0	18.0	22.1	27.5	10.6	2.6	0.3	239,952
Northern Plains	21.4	20.7	24.1	24.6	7.2	1.7	.3	58,267
Lake States	21.4	19.8	22.9	26.2	7.9	1.6	.1	54,710
Appalachia	37.0	19.7	16.6	16.2	6.8	2.9	.9	38,557
Delta	12.0	11.0	13.9	23.4	19.1	13.8	6.8	20,475
Southeast	26.2	19.0	19.4	21.4	9.1	3.9	1.1	16,088
Northeast	38.6	21.1	17.2	15.0	5.4	2.3	.4	10,599
Southern Plains	18.3	20.5	20.9	24.2	9.8	5.0	1.3	2,684
United States	21.6	18.5	21.4	25.2	9.7	2.9	.7	441,899 [2]

[1] Totals may not add to 100 percent due to rounding.
[2] Regional totals do not add to U.S. total because not all farms are reported in each State.
Source: 1987 *Census of Agriculture.*

Government programs strongly influence locations of soybean production by affecting the relative profitability of soybeans compared with program corn, cotton, and wheat.

The Corn Belt has always dominated U.S. soybean production, although its share declined from 74 percent in 1950-54 to 58 percent in 1985-88 (table 2). The average annual acreage planted to soybeans in the Lake States and Corn Belt increased from about 12.0 million acres for 1950-54 to 36.7 million acres in 1985-88. Nearly half of the principal crop acreage in the Delta was planted to soybeans in 1988. Other regions where soybeans are a major crop are Appalachia (41 percent), Corn Belt (35 percent), and Southeast (34 percent).

Substantial acreage expansion occurred in all soybean-producing regions through the 1970's and early 1980's. In the South (Appalachia, Delta, and Southeast), the average annual acreage rose from less than 4 million acres in the early 1950's to 22.6 million acres during 1980-84, before dropping sharply to 15.6 million acres for 1985-88 (fig. 1). Production in the South increased from 11 percent (1950-54) to 19 percent (1985-88) of U.S. soybean production (table 2). The proportion of soybean production accounted for by the Lake States has remained around 10 percent, although acreage

Table 2—Soybean acreage, yields, and production by region, 1950–88

Region	1950–54	1960–64	1970–74	1980–84	1985–88
			1,000 acres		
Planted acres:					
Corn Belt	10,456	16,032	25,156	31,022	30,338
Delta	2,131	4,433	8,732	10,538	7,920
Lake States	1,582	2,819	4,237	6,365	6,328
Appalachia	1,317	1,929	3,960	6,299	4,703
Northern Plains	759	1,400	2,420	5,304	6,321
Southeast	487	1,000	2,947	5,812	3,021
Northeast	267	490	584	972	961
Southern Plains	95	228	446	853	494
United States	17,094	28,331	48,481	67,168	60,085
Harvested acres:					
Corn Belt	10,066	15,870	24,881	30,663	29,968
Delta	1,183	4,301	8,533	10,183	7,643
Lake States	1,504	2,783	4,177	6,255	6,185
Appalachia	759	1,640	3,733	6,076	4,498
Northern Plains	671	1,366	2,362	5,151	6,166
Southeast	239	911	2,847	5,552	2,725
Northeast	201	454	570	950	940
Southern Plains	54	206	417	773	436
United States	14,677	27,531	47,520	65,603	58,559
			Bushels per harvested acre		
Yields:					
Corn Belt	22.0	26.5	29.8	34.3	36.4
Delta	15.1	20.0	22.1	22.3	22.7
Lake States	19.1	21.3	25.4	32.4	32.6
Appalachia	16.6	22.2	24.1	24.2	26.3
Northern Plains	14.0	19.7	23.2	27.8	31.4
Southeast	13.2	19.8	21.5	20.5	22.0
Northeast	17.5	20.3	26.8	27.5	28.6
Southern Plains	11.3	20.7	22.8	22.2	24.0
United States	20.3	24.0	26.7	29.4	32.0
			1,000 bushels		
Production:					
Corn Belt	221,841	420,294	742,433	1,051,265	1,090,460
Delta	17,887	86,040	188,404	227,119	173,491
Lake States	28,765	59,244	105,962	202,705	201,643
Appalachia	12,598	36,453	89,943	146,888	118,460
Northern Plains	9,401	26,972	54,712	143,341	193,513
Southeast	3,163	18,029	61,065	113,963	60,068
Northeast	3,508	9,224	15,282	26,163	26,906
Southern Plains	608	4,273	9,508	17,165	10,475
United States	297,770	660,529	1,267,309	1,928,609	1,874,895

Source: Schaub and others (1988); and U.S. Department of Agriculture, National Agricultural Statistics Service, *Crop Production*, recent issues.

expanded fourfold since the early 1950's. Tremendous growth in the Northern Plains' soybean acreage more than doubled that region's share of production to 10 percent of the U.S. total during 1985-88.

Soybeans are usually grown in rotation with other crops, especially corn. Few farmers specialize in soybeans except in the Delta. Most of the production and harvesting equipment for wheat and corn can also be used for soybeans, making soybeans an important rotation crop. The 1987 Census of Agriculture indicates that 80 percent of farmers who harvested corn in Illinois also harvested soybeans. Results were similar for Iowa where 73 percent of the corn farmers also harvested soybeans. Of the farmers who harvested wheat in Illinois, 90 percent harvested soybeans. Of the Mississippi farmers who harvested cotton, 68 percent also harvested soybeans.

Double-Cropping Soybeans

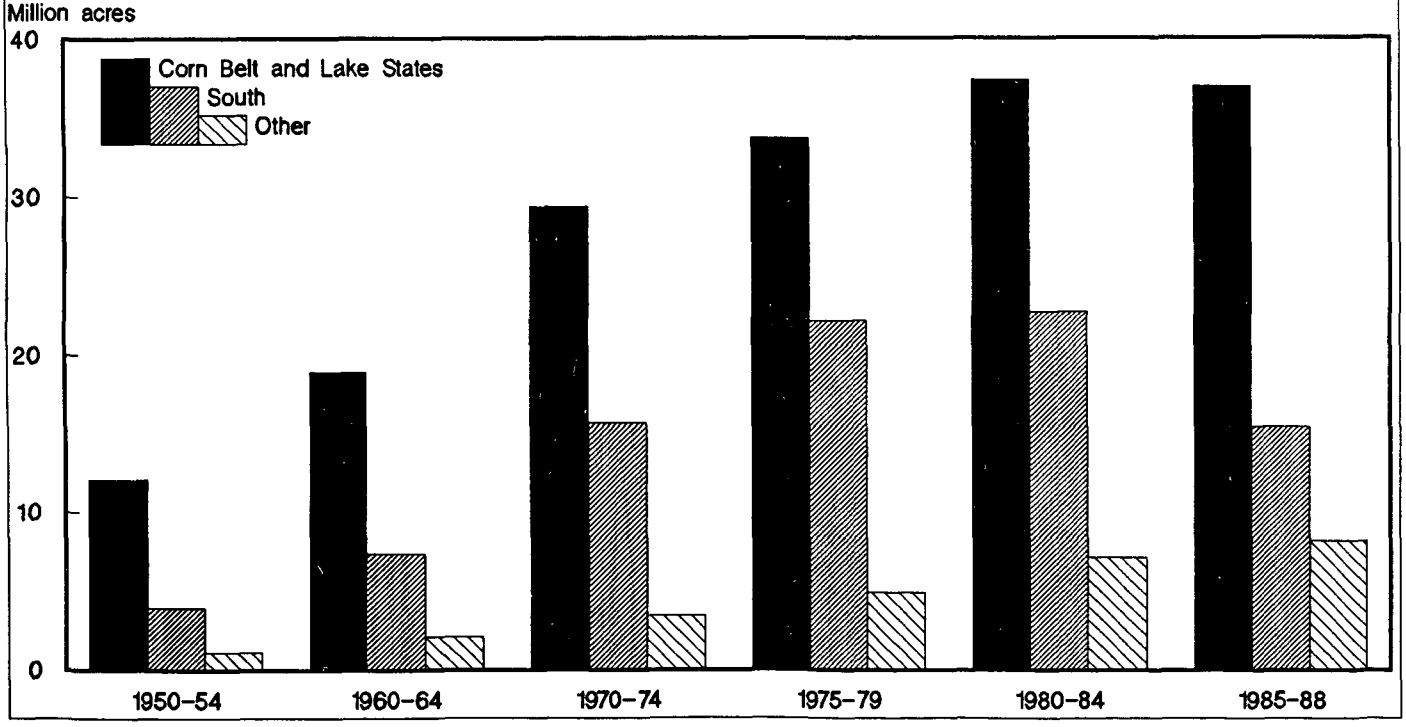
Double-cropping of soybeans increased from 7 percent of the soybean acreage planted in 1974 to 16 percent in 1982, before falling to 9 percent in 1988. The majority of double-cropped soybean acreage follows wheat. Double-cropping of soybeans has declined since 1982 because of lower soybean prices, Government acreage reduction programs, other acreage restrictions for wheat, and unfavorable weather in the South.

The three leading States in double-cropped soybean acreage planted were Arkansas, Georgia, and Missouri during the 1970's and early 1980's. In 1982, a year of record double-cropped soybean acreage, Arkansas and Georgia each had 1.6 million acres, and Missouri had nearly 950,000 acres.

Double-cropping has declined sharply since the early 1980's. Average double-cropped acreage in 1987 and 1988 in the three States above were: 790,000 in Arkansas, 285,000 in Georgia, and 385,000 in Missouri. Georgia's double-cropped acreage dropped in the past 2 years behind the Appalachian States of North Carolina (435,000 acres), Kentucky (305,000 acres), and Tennessee (300,000 acres).

The greatest potential for acreage expansion appears to be in the South, if prices rise above current levels relative to competing crops. Soybeans are more competitive with other crops in the South (excluding price-supported cotton, peanuts, and tobacco) than in the Corn Belt. Double-cropping soybeans with other crops is expected to increase in the South if soybean and win-

Figure 1
Planted soybean acreage, by region



ter wheat returns improve. Lower acreage reduction requirements on program wheat acreage could lead to substantially more soybean-wheat double-cropping in 1989 and 1990 (Wescott). The potential is greatest in irrigated areas. The 1982 Census of Agriculture indicated only 3.6 percent of all soybean acreage was irrigated, with more than three-quarters of that acreage in the Delta, Northern Plains, and Southern Plains.

Domestic Soybean Uses

Demand for soybeans is derived from the demand for the joint products of meal and oil. The complex interrelationships among supply, demand, and prices of these products shift considerably from year to year and change the relative importance of meal and oil in determining the demand for soybeans. Soybeans are crushed primarily as a protein meal source, although the oil value has exceeded that of meal in a few years. The use and ending stocks of soybeans are shown in table 3.

Soybean meal is the major protein meal fed to livestock and poultry. Soybean meal increased from 59 percent of the total protein fed in 1965/66 to 75 percent in the 1980's. Poultry accounts for about 45 percent of

Table 3—Use and ending stocks for U.S. soybeans, 1954–89 [1]

Year beginning Sept. 1	Crush	Seed, feed, and residual	Exports	Total use	Ending stocks	Stocks-to-use ratio
	Million bushels					*Percent*
1954	241	29	57	327	23	7.0
1955	282	24	69	375	21	5.6
1956	314	41	84	439	32	7.3
1957	351	33	88	472	43	9.1
1958	399	31	105	535	88	16.4
1959	394	35	140	569	52	9.1
1960	406	39	135	580	27	4.7
1961	431	47	149	627	78	12.4
1962	473	48	181	702	46	6.6
1963	437	54	187	678	67	9.9
1964	479	47	212	738	30	4.1
1965	537	52	251	840	36	4.3
1966	559	53	262	874	90	10.3
1967	576	57	267	900	166	18.4
1968	606	53	287	946	327	34.6
1969	737	58	433	1,228	230	18.7
1970	760	64	434	1,258	99	7.9
1971	721	65	417	1,203	72	6.0
1972	722	82	479	1,283	60	4.9
1973	821	77	539	1,437	171	11.9
1974	701	77	421	1,199	188	15.7
1975	865	71	555	1,491	245	16.4
1976	790	77	564	1,431	103	7.2
1977	927	82	700	1,709	161	9.4
1978	1,018	97	739	1,854	176	9.4
1979	1,123	81	875	2,079	358	17.2
1980	1,020	99	724	1,843	313	17.3
1981	1,030	89	929	2,048	254	13.0
1982	1,108	86	905	2,099	345	18.2
1983	983	79	743	1,805	176	9.8
1984	1,030	93	598	1,721	316	18.4
1985	1,053	86	740	1,879	536	28.5
1986	1,179	104	757	2,040	436	21.4
1987	1,174	81	802	2,057	302	14.7
1988 [2]	1,060	96	530	1,686	155	9.2
1989 [3]	1,105	95	575	1,775	285	16.1

[1] Stocks on a September 1 basis are not available prior to 1953.
[2] Preliminary.
[3] Forecast.

Source: Schaub and others (1988); and U.S. Department of Agriculture, Economic Research Service, Foreign Agricultural Service, *World Agricultural Supply and Demand Estimates*, Aug. 10, 1989.

domestic soybean meal consumption, with broilers consuming half of this amount. Hogs consume nearly a third of the soybean meal fed domestically. Demand for soybean meal is also influenced by supplies and prices of competing meals such as cottonseed. Feed grain policies affect the profitability of livestock feeding and, consequently, the demand for soybean meal. About three-quarters of U.S. soybean meal is used domestically, with the remainder being exported (table 4).

Soybean oil comprises almost three-fourths of the total fats and oils used in edible oil products. The proportion of soybean oil use increased from 54 percent in 1960/61 to 74 percent in 1987/88. Nearly half of the domestic edible use of soybean oil is in salad and cooking oils, followed by baking and frying fats (35 percent) and margarine (16 percent). Eighty to 90 percent of U.S. soybean oil is used domestically, with the balance being exported or carried as ending stocks (table 5). Other fats and oils that compete with soybean oil in edible products are cottonseed, corn, peanut, lard, edible tallow, palm, rapeseed, sunflower, and coconut.

The proportion of soybean oil used in inedible products declined from 6 percent in 1960 to only 3 percent in 1987/88. Inedible uses include paint, varnish, fatty acids, resins, and plastics. There is potential for a number of new industrial uses for soybean oil. Low-cost petroleum products generally dominate industrial oil application at this time, but nonpetroleum fats and oils are being used in the production of alkyd resins, epoxidized oils, surfactants, and plasticizers.

Table 4—U.S. soybean meal supply and disappearance, 1960–89

Year beginning Oct. 1	Supply			Disappearance			Ending stocks [1]
	Stocks [1]	Production	Total	Exports	Domestic	Total	
				1,000 short tons			
1960	83	9,452	9,535	590	8,867	9,457	78
1961	78	10,342	10,420	1,064	9,262	10,326	94
1962	94	11,127	11,221	1,475	9,586	11,061	159
1963	159	10,609	10,768	1,479	9,167	10,646	122
1964	122	11,286	11,408	2,036	9,265	11,301	106
1965	106	12,901	13,007	2,604	10,271	12,875	132
1966	132	13,483	13,615	2,657	10,820	13,477	138
1967	138	13,660	13,798	2,899	10,753	13,652	145
1968	145	14,581	14,726	3,044	11,525	14,569	157
1969	157	17,596	17,753	4,035	13,581	17,616	137
1970	137	18,035	18,172	4,559	13,467	18,026	146
1971	146	17,024	17,170	3,805	13,173	16,978	192
1972	192	16,709	16,901	4,745	11,972	16,717	183
1973	183	19,674	19,857	5,548	13,802	19,350	507
1974	507	16,702	17,209	4,299	12,551	16,850	358
1975	358	20,754	21,112	5,145	15,612	20,757	355
1976	355	18,488	18,843	4,559	14,056	18,615	228
1977	228	22,371	22,599	6,080	16,276	22,356	243
1978	243	24,354	24,597	6,610	17,720	24,330	267
1979	267	27,105	27,372	7,932	19,214	27,146	226
1980	226	24,312	24,538	6,784	17,591	24,375	163
1981	163	24,634	24,797	6,908	17,714	24,622	175
1982	175	26,714	26,889	7,109	19,306	26,415	474
1983	474	22,756	23,230	5,360	17,615	22,975	255
1984	255	24,529	24,784	4,917	19,480	24,397	387
1985	387	24,951	25,338	6,036	19,090	25,126	212
1986	212	27,758	27,970	7,743	20,387	27,730	240
1987	240	28,060	28,300	6,871	21,276	28,147	153
1988 [2]	153	24,897	25,050	5,250	19,500	24,750	300
1989 [3]	300	26,250	26,550	5,250	21,000	26,250	300

[1] Stocks at processor plants, includes millfeed (hull meal).
[2] Preliminary.
[3] Forecast.
Source: Schaub and others (1988); and U.S. Department of Agriculture, Economic Research Service, Foreign Agricultural Service, *World Agricultural Supply and Demand Estimates*, Aug. 10, 1989.

Table 5—U.S. soybean oil supply and disappearance, 1960–89

Year beginning Oct. 1	Supply			Disappearance			Ending stocks
	Stocks	Production	Total	Exports	Domestic	Total	
				Million pounds			
1960	308	4,420	4,728	721	3,330	4,051	677
1961	677	4,790	5,467	1,309	3,540	4,849	618
1962	618	5,091	5,709	1,165	3,624	4,789	920
1963	920	4,822	5,742	1,106	4,058	5,164	578
1964	578	5,146	5,724	1,340	4,087	5,427	297
1965	297	5,800	6,097	923	4,712	5,635	462
1966	462	6,076	6,538	1,077	4,865	5,942	596
1967	596	6,032	6,628	963	5,125	6,088	540
1968	540	6,531	7,071	870	5,786	6,656	415
1969	415	7,904	8,319	1,419	6,357	7,776	543
1970	543	8,265	8,808	1,743	6,292	8,035	773
1971	773	7,892	8,665	1,398	6,482	7,880	785
1972	785	7,501	8,286	1,066	6,704	7,770	516
1973	516	8,995	9,511	1,436	7,280	8,716	794
1974	794	7,375	8,169	1,028	6,580	7,608	561
1975	561	9,630	10,191	976	7,964	8,940	1,251
1976	1,251	8,578	9,829	1,547	7,511	9,058	771
1977	771	10,288	11,059	2,057	8,273	10,330	729
1978	729	11,323	12,052	2,334	8,942	11,276	776
1979	776	12,105	12,881	2,690	8,891	11,671	1,210
1980	1,210	11,270	12,480	1,631	9,113	10,744	1,736
1981	1,736	10,979	12,715	2,077	9,536	11,612	1,103
1982	1,103	12,040	13,143	2,025	9,857	11,882	1,261
1983	1,261	10,872	12,133	1,824	9,588	11,412	721
1984	721	11,468	12,189	1,640 [1]	9,917	11,557	632
1985	632	11,617	12,249	1,249 [1]	10,053	11,302	947
1986	947	12,783	13,730	1,172 [1]	10,833	12,005	1,725
1987	1,725	12,974	14,895	1,677 [1]	10,930	12,803	2,092
1988 [2]	2,092	11,648	13,890	1,275 [1]	10,400	11,825	2,065
1989 [3]	2,065	12,275	14,370	1,370 [1]	10,900	12,300	2,070

[1] Data represents net exports; imports for 1984–89 are, respectively, 20, 8, 15, 196, 150, and 30 million pounds.
[2] Preliminary.
[3] Forecast.
Source: Schaub and others (1988); and U.S. Department of Agriculture, Economic Research Service, Foreign Agricultural Service, *World Agricultural Supply and Demand Estimates*, Aug. 10, 1989.

Processing Margins

The processing margin is the difference between the price of soybeans and the value of the soybean products: oil and meal. The margin indicates the cost, including profit, of providing crushing services. A number of factors influence the margin. These include fluctuations in soybean supply and demand, the buying practices of the processor, location and size of the processor, competition for soybean purchases, and product yields per bushel of soybeans.

During the 1970's, the annual average processing margin (based on spot market prices) averaged 32 cents per bushel, double the average for the 1960's. From 1983/84 to 1987/88, processing margins ranged from 27 cents (1983/84) to 81 cents (1987/88) per bushel with an average of 41 cents per bushel.

Soybean Product Value

The value of soybeans depends on the prices and yields of oil and meal (see app. table 2 for soybean value comparisons). The oil and meal content of soybeans varies among regions because of geographic and agronomic factors. The oil content tends to decrease, while the protein and meal content tends to increase, as soybeans are grown in progressively warmer parts of the United States. The variation in oil and meal content of soybeans is not included in the soybean grade standards, so prices paid for soybeans are adjusted accordingly in certain areas.

The amount and value of meal obtained from processing a bushel of soybeans exceeds that from the oil. During the 1983-87 crop years, average meal yield was 4.3 times that of oil: 47.3 pounds (80 percent) of

meal to 11 pounds (18 percent) of oil per 60-pound bushel. However, oil sold for 2.8 times the price of meal (23.4 cents versus 8.5 cents), so soybean oil represented 39 percent of the value and soybean meal accounted for 61 percent.

Costs and Returns

Farmers' returns above cash production expenses have varied considerably during the 1980's. Per-bushel returns above cash expenses fell steadily from 1978 to 1982 (table 6), due mainly to rapidly rising costs of production. In 1983, the payment-in-kind program reduced soybean acreage and total cash expenses fell. However, the value of soybean production increased because of higher prices. Since 1983, per-bushel returns have continued to be depressed relative to those of the late 1970's. An increase in soybean prices, due to the drought-reduced crop of 1988, increased per-bushel returns for the 1988 crop of soybeans. However, market returns are expected to be much lower for the 1989 and 1990 crops of soybeans.

Returns to soybeans per planted acre vary from year to year depending on prices and yields, but generally declined through the 1980's before rebounding in 1987 and 1988. For example, returns above cash expenses from soybeans dropped from $103 per planted acre in 1980 to $77 in 1987. Although average yields increased from 26 bushels per planted acre in 1980 to 34 bushels in 1987, returns per acre and per bushel declined because of lower soybean prices during the 1980's, except for 1983 (another drought-reduced crop). However, gross returns (nominal) for 1988/89 soybeans are forecast to be $197 per harvested acre (app. table 2), in spite of drought-reduced average yields.

Returns above cash expenses vary among regions. Returns per bushel and per acre are highest in the Corn Belt and Lake States, even though expenses are high, because of higher yields. Returns are lowest in the Southeast because of relatively low yields and high expenses for fertilizer, herbicides, and insecticides. The relatively low returns in the South are partially offset when soybeans are double-cropped with wheat because fixed costs such as land and equipment can be spread over two crops.

Price Trends

Soybean prices followed a moderate upward trend through the 1960's and then increased substantially in the 1970's (fig. 2, app. table 3). Average farm prices of soybeans rose from $2.13 per bushel for the 1960/61 marketing year to $2.85 in 1970/71, and then jumped to $7.57 per bushel for 1980/81.

Considerable year-to-year fluctuation characterized price behavior during the 1970's and 1980's. Declining prices in 1982 corresponded to that year's recession. But, in 1983, the payment-in-kind program and drought-reduced crop boosted prices. Prices fell sharply during 1984-86 as foreign economic growth slowed and the strength of the U.S. dollar raised importers' prices. Prices rose again in 1987 in response to greater soy-

Table 6—U.S. soybean sector costs and returns, 1976–87

Crop year	Value of production	Total cash expenses [1]	Return above cash expenses [2]		
			Total	Nominal	Deflated
	Billion dollars			*Dollars per bushel*	
1976	8.78	3.19	5.58	4.33	6.86
1977	10.39	4.15	6.24	3.53	5.25
1978	12.45	4.90	7.54	4.04	5.60
1979	14.20	6.03	8.17	3.61	4.59
1980	13.61	6.77	6.84	3.71	4.45
1981	12.01	7.18	4.83	2.43	2.76
1982	12.38	7.47	4.90	2.24	2.24
1983	12.81	7.03	5.77	3.53	3.40
1984	10.87	7.91	2.95	1.59	1.48
1985	10.60	6.10	4.50	2.14	1.93
1986	9.27	5.35	3.93	2.02	1.77
1987	11.31	5.56	5.75	2.99	2.54

[1] Cash costs per planted acre times acreage planted.
[2] The difference between value of production and total cash expenses; this difference was divided by the quantity produced and was then deflated (1982 = 1.0).
Source: U.S. Department of Agriculture, Economic Research Service, *Economic Indicators of the Farm Sector: Costs of Production*, annual issues; and U.S. Department of Agriculture, National Agricultural Statistics Service, *Agricultural Prices*, annual issues.

bean demand, and the 1988 drought led to even higher prices.

Soybean Trade and Foreign Competition

World trade in soybeans and products (meal and oil) grew dramatically from the early 1960's to the early 1980's. Rising real incomes in many countries led to increased consumption of livestock products, which in turn stimulated the demand for oilseed meals as protein in feed rations. Also, technological innovations in food processing, coupled with changing consumer tastes, resulted in broader use of vegetable oils in food and industrial products. Demand for oilseed products outpaced domestic production in many countries, expanding import markets for oilseeds and products in those countries.

Soybean Exports

Soybeans account for about 75 percent of international trade in oilseeds (app. table 4). World exports of soybeans grew from 6.5 million tons in 1964/65 to 29.5 million tons in 1981/82 and have ranged from 25 to 30 million tons since 1981/82 (table 7, app. table 5).

Soybeans dominate U.S. oilseed exports. Soybean export earnings for FY 1984-88 averaged $4.6 billion, representing 93 percent of oilseed export earnings and 14 percent of total U.S. agricultural export sales. The U.S. soybean industry has become increasingly dependent on the export market. About 42 percent of the U.S. soybean crop was exported as beans in the early 1980's, compared with 24 percent in the early 1960's and 37 percent in the early 1970's. The United States is the leading exporter, although the U.S. export share has declined from around 90 percent in the late 1960's and early 1970's to nearly 60 percent in the late 1980's (app. table 6) because of the emergence of Brazil as a major soybean exporter in the early 1970's, followed by Argentina in the late 1970's (app. table 7). Higher prices for soybeans, beginning in the early 1970's, appear to have accelerated the expansion of the soybean industries in Brazil and Argentina.

U.S. soybean exports have risen substantially since the mid-1960's, from 5.8 million tons in 1964/65 to a record 25.3 million tons in 1981/82, a fourfold increase (table 7). Primary causes for this growth included an expansion in oilseed crushing facilities, especially in Western Europe and Japan, a response to the strong demand for soybean meal for use in high concentrate

Figure 2
Soybean average market prices and support prices

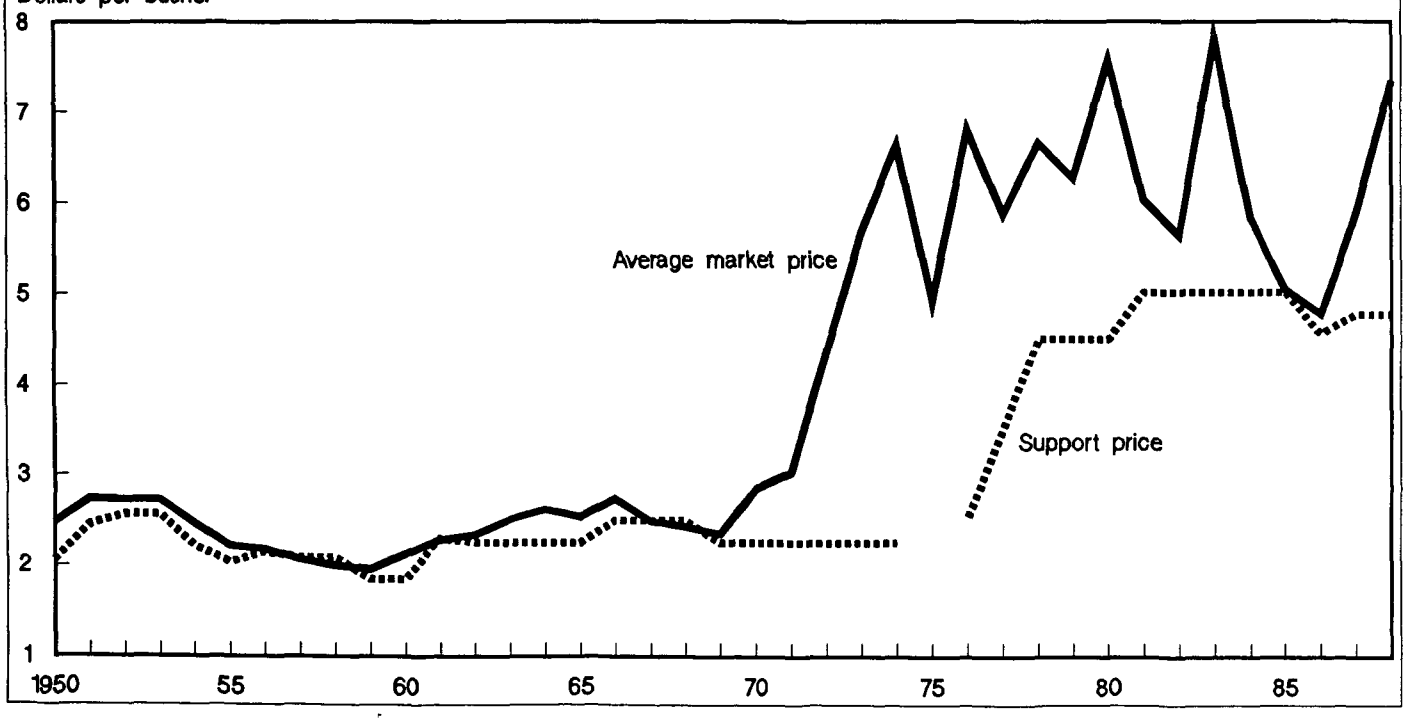


Table 7—World soybean exports, major exporters and regions, 1964–89

Crop year [1]	United States	Brazil	Argentina	China	Other countries			World
					Developed	Developing	Centrally planned	
				1,000 metric tons				
1964/65	5,774	75	0	577	89	33	0	6,548
1965/66	6,820	121	0	550	63	37	1	7,592
1966/67	7,119	305	0	565	99	33	4	8,125
1967/68	7,255	66	0	571	46	41	14	7,993
1968/69	7,805	310	0	488	37	29	6	8,675
1969/70	11,773	290	0	424	50	34	0	12,571
1970/71	11,806	230	0	460	38	42	0	12,576
1971/72	11,344	1,023	0	370	59	70	40	12,906
1972/73	13,048	1,788	0	310	144	113	38	15,441
1973/74	14,673	2,862	0	340	53	131	27	18,086
1974/75	11,450	3,516	0	330	126	147	11	15,580
1975/76	15,107	3,328	111	178	244	261	0	19,229
1976/77	15,351	2,581	623	115	152	306	9	19,137
1977/78	19,061	659	1,969	90	302	258	0	22,339
1978/79	20,117	638	2,776	274	464	389	0	24,658
1979/80	23,818	1,533	2,726	207	325	454	0	29,063
1980/81	19,712	1,502	2,190	143	312	679	0	24,538
1981/82	25,285	797	2,151	110	307	878	11	29,539
1982/83	24,634	1,316	1,338	320	267	662	17	28,554
1983/84	20,215	1,580	3,132	800	154	484	5	26,370
1984/85	16,279	3,456	2,954	1,080	216	888	40	24,913
1985/86	20,158	1,192	2,566	1,260	301	565	55	26,097
1986/87	20,600	3,290	1,292	1,750	377	1,151	35	28,495
1987/88	21,827	3,020	2,100	1,482	514	1,373	55	30,371
1988/89 [2]	14,424	4,600	500	1,200	471	1,760	60	23,015
1989/90 [3]	15,649	4,500	2,500	1,200	446	1,463	45	25,803

[1] Based on aggregate of differing local marketing years.
[2] Preliminary.
[3] Forecast.
Source: U.S. Department of Agriculture, Foreign Agricultural Service, Oilseeds and Products Division: production, supply, and distribution database, August 1989.

feed rations, and the growing world demand for vegetable oils. The competitive position of U.S. soybeans for export has been fostered by a domestic policy of small reserves and relatively low loan rates. Soybeans have also benefited from duty-free status in the European Community as a result of the Dillon Round of trade negotiations.

Another factor contributing to the strong growth in U.S. soybean exports was the decline in Brazil's soybean exports from the mid-1970's to the mid-1980's. This was the result of Brazil's development of a large crushing capacity, small crops in 1978 and 1979, and a myriad of changing taxes, export subsidies, and export quotas designed to stimulate the expansion of domestic crush capacity and to increase the export of meal and oil rather than beans. Argentine soybean exports are also taxed at higher rates than meal and oil exports to generate revenue and encourage sales to the domestic crushing industry, thereby increasing the value added before exporting. However, South American soybean exports are forecast to be the highest ever in 1989/90.

U.S. soybean exports have declined since 1981/82 because of slowing economic growth abroad, the strong U.S. dollar which raised the cost to importers into 1985 (Stallings), competition from foreign oilseeds, and drought-reduced U.S. crops in 1983 and 1988.

The EC and Japan are the world's major importers of soybeans (table 8). They accounted for 46 percent and 21 percent, respectively, of U.S. soybean exports in FY 1983-87. Other significant U.S. markets during that period included Taiwan, 7 percent; Mexico, 6 percent; and South Korea, 4 percent (app. table 8).

Soybean Meal Exports

World trade in soybean meal also increased substantially, as world exports rose from 2.8 million tons in

Table 8—World soybean imports, major importers and regions, 1964–89

Crop year [1]	EC–12 [2]	Japan	Other countries			World
			Developed	Developing	Centrally planned	
			1,000 metric tons			
1964/65	3,412	1,864	634	543	213	6,666
1965/66	4,173	2,178	677	563	79	7,670
1966/67	4,532	2,183	672	750	112	8,249
1967/68	4,548	2,435	552	771	78	8,384
1968/69	5,022	2,604	563	927	211	9,327
1969/70	6,972	3,257	722	1,232	160	12,343
1970/71	7,153	3,226	758	1,309	201	12,647
1971/72	7,997	3,396	733	1,345	464	13,935
1972/73	7,971	3,635	654	1,444	1,176	14,880
1973/74	10,765	3,244	853	1,573	855	17,290
1974/75	10,074	3,334	811	1,631	515	16,365
1975/76	11,410	3,554	737	2,042	2,140	19,883
1976/77	11,237	3,602	780	2,229	1,868	19,716
1977/78	13,568	4,260	690	2,837	1,760	23,115
1978/79	14,633	4,132	845	3,444	2,810	25,878
1979/80	16,231	4,165	990	3,613	3,272	28,271
1980/81	13,217	4,213	918	5,435	2,451	26,223
1981/82	15,945	4,486	927	5,380	2,489	29,243
1982/83	15,555	4,871	990	5,140	1,870	28,426
1983/84	12,878	4,728	785	5,233	1,792	25,416
1984/85	12,890	4,611	776	5,797	1,433	25,507
1985/86	13,218	4,796	678	5,523	3,387	27,602
1986/87	14,422	4,866	796	6,782	2,517	29,383
1987/88	13,567	4,847	798	6,975	2,415	28,602
1988/89 [3]	10,788	4,300	659	6,739	1,270	23,756
1989/90 [4]	12,001	4,400	667	6,521	1,890	25,479

[1] Based on aggregate of differing local marketing years.
[2] Includes intra-EC trade.
[3] Preliminary.
[4] Forecast.
Source: U.S. Department of Agriculture, Foreign Agricultural Service, Oilseeds and Products Division: production, supply, and distribution database, August 1989.

1964/65 to 27.6 million tons in 1987/88 (table 9). Soybean meal now accounts for 70 percent of the major protein meals traded internationally (app. table 9). Brazil is the leading exporter, followed by Argentina, the United States, and the EC. The EC is the largest soybean meal importer, followed by the USSR, Poland, and East Germany (table 10).

Soybean meal is the principal oilseed meal exported by the United States. Export earnings averaged $1.18 billion for FY 1984-88, accounting for 98 percent of U.S. oilseed cake and meal exports and almost 4 percent of total U.S. agricultural export earnings.

U.S. soybean meal exports grew from 1.8 million tons in 1964/65 to 7.2 million tons in 1979/80, and averaged around 5.5 million tons in the latter 1980's. This increase coincided with a growth in livestock production around the world and expanded use of high protein meals in feed rations. Major outlets for U.S. soybean meal in FY 1984-88 were the EC, which took 42 percent of U.S. exports; Venezuela, 11percent; Canada, 11 percent; and the USSR, 5 percent.

The United States was the leading exporter of soybean meal during the 1960's and through the mid-1970's. However, in 1977, a decline in U.S. exports, coupled with a large increase in Brazil's exports, dropped the United States to second place in soybean meal exports that year. The United States temporarily regained its lead in 1978 and 1979 as a result of smaller crops in Brazil, but has been behind Brazil since then.

U.S. exports have remained below the record 1979/80 level because of expanding exports from Brazil and Argentina, where export taxes encourage soybean

Table 9—World soybean meal exports, major exporters and regions, 1964–89

Crop year [1]	United States	Brazil	Argentina	EC–12 [2]	Other countries			World
					Developed	Developing	Centrally planned	
				1,000 metric tons				
1964/65	1,847	105	0	606	246	22	0	2,826
1965/66	2,360	185	0	749	226	14	0	3,534
1966/67	2,410	125	0	759	195	9	0	3,498
1967/68	2,630	235	0	798	195	11	0	3,869
1968/69	2,762	310	0	991	179	32	0	4,274
1969/70	3,661	580	0	1,231	223	33	0	5,728
1970/71	4,136	990	0	1,364	198	31	0	6,719
1971/72	3,452	1,506	0	1,670	210	27	23	6,888
1972/73	4,304	1,373	14	2,167	250	49	0	8,157
1973/74	5,033	2,396	12	2,263	286	57	21	10,068
1974/75	3,900	3,450	158	1,740	266	109	25	9,648
1975/76	4,667	4,078	251	1,909	153	108	16	11,182
1976/77	4,136	5,329	325	1,818	142	143	17	11,910
1977/78	5,516	5,368	370	2,789	162	218	30	14,453
1978/79	5,997	5,038	260	3,116	186	341	31	14,969
1979/80	7,196	6,936	277	3,767	202	408	66	18,852
1980/81	6,154	8,562	591	3,904	237	247	185	19,880
1981/82	6,266	7,822	1,209	4,547	201	439	289	20,773
1982/83	6,449	7,994	1,765	5,861	180	489	586	23,324
1983/84	4,862	7,690	2,663	5,382	158	499	708	21,962
1984/85	4,460	8,628	2,521	5,149	152	575	661	22,146
1985/86	5,476	6,961	3,248	5,081	152	753	1,133	22,804
1986/87	6,661	8,030	3,600	5,079	159	681	1,547	25,757
1987/88	6,233	8,477	5,350	4,323	146	641	2,420	27,590
1988/89 [3]	4,763	9,500	4,450	4,075	136	1,275	1,606	25,805
1989/90 [4]	4,763	9,600	5,450	4,395	141	1,099	1,605	27,053

[1] Based on aggregate of differing local marketing years.
[2] Includes intra-EC trade.
[3] Preliminary.
[4] Forecast.
Source: U.S. Department of Agriculture, Foreign Agricultural Service, Oilseeds and Products Division: production, supply, and distribution database, August 1989.

meal and oil exports over soybean exports, and expanding exports from the EC. The EC, a major soybean processor, has been a strong competitor in West and East European markets because of crushing subsidies that allow high support prices for domestic producers but allow oil and meal to be sold at world prices. Slowed economic growth abroad and the strength of the dollar also dampened U.S. exports.

Soybean Oil Exports

World exports of soybean oil expanded from 0.6 million tons in the latter 1960's to 4.0 million tons in 1986/87 (table 11). Soybean oil accounts for around 21 percent of the world's edible oil trade, second only to palm oil (app. table 10). Soybean oil supplies are more closely tied to the demand for soybean meal than to the demand for vegetable oils. The EC is the largest soybean oil exporter (including intra-EC trade), followed by Brazil, the United States, and Argentina.

U.S. export earnings from soybean oil averaged $428 million for FY 1984-88, about 1 percent of total U.S. agricultural export sales. U.S. soybean oil exports showed no discernible trend between 1964/65 and 1976/77, fluctuating between 395,000 tons and 790,000 tons. Exports rose from 1976 to 1980, reflecting strong demand. Since 1981, exports have fallen short of the record attained in 1979/80. The decline reflects (1) lower U.S. soybean oil production; (2) competition from Brazil, Argentina, and the EC (table 11); (3) increased price competition from other oils, mainly palm and rapeseed oil; (4) slower economic growth abroad and financial indebtedness of many importing countries; and (5) the high relative cost of U.S. soybean oil due to the strong value of the U.S. dollar in the early 1980's.

The U.S. share of world soybean oil exports—75 percent in the 1960's—dropped to only 14 percent in 1986/87. The EC emerged as a net exporter in the mid-

Table 10—World soybean meal imports, major importers and regions, 1964–89

Crop year [1]	EC-12 [2]	USSR	East Germany	Poland	Other countries			World
					Developed	Developing	Centrally planned	
				1,000 metric tons				
1964/65	1,968	0	170	10	555	47	132	2,882
1965/66	2,543	0	200	53	557	47	132	3,532
1966/67	2,465	0	295	77	550	82	234	3,703
1967/68	2,675	0	320	75	547	85	217	3,919
1968/69	3,082	0	390	90	549	111	299	4,521
1969/70	3,647	0	445	103	667	171	629	5,662
1970/71	4,313	0	540	113	667	308	707	6,648
1971/72	4,663	0	710	256	706	360	957	7,652
1972/73	4,938	0	655	499	955	231	1,290	8,568
1973/74	5,127	0	705	485	997	475	1,424	9,213
1974/75	5,096	0	740	575	816	504	1,220	8,951
1975/76	6,323	0	745	548	1,054	821	1,460	10,951
1976/77	6,275	0	850	644	1,209	1,364	1,417	11,759
1977/78	8,507	0	800	730	1,381	1,562	1,596	14,576
1978/79	8,980	52	840	938	1,403	1,817	1,635	15,665
1979/80	10,077	345	842	1,060	1,343	2,317	1,948	17,932
1980/81	9,783	966	773	1,227	1,378	2,468	2,164	18,759
1981/82	12,153	1,103	1,028	640	1,324	3,106	1,684	21,038
1982/83	12,338	2,812	1,092	350	1,343	3,488	1,671	23,094
1983/84	12,435	827	1,317	670	1,514	4,075	1,574	22,412
1984/85	13,336	550	972	807	1,515	3,928	1,721	22,829
1985/86	13,785	478	1,111	785	1,611	4,356	1,794	23,920
1986/87	13,596	2,900	1,040	1,030	1,532	4,690	1,837	26,625
1987/88	12,051	3,000	915	980	2,030	4,897	1,812	25,685
1988/89 [3]	11,515	4,000	950	1,000	1,725	5,013	1,769	25,972
1989/90 [4]	12,563	4,200	1,080	1,000	1,905	5,181	1,763	27,692

[1] Based on aggregate of differing local marketing years.
[2] Includes intra-EC trade.
[3] Preliminary.
[4] Forecast.
Source: U.S. Department of Agriculture, Foreign Agricultural Service, Oilseeds and Products Division: production, supply, and distribution database, August 1989.

1960's, and Brazil became a large exporter in the 1970's, joined by Argentina in the 1980's.

Pakistan and Iran are the largest soybean oil importers, followed by India (table 12). Primary foreign customers for U.S. soybean oil during FY 1984-88 were Pakistan, which took 34 percent; India, 13 percent; Mexico, 6 percent; and the Dominican Republic, 5 percent. A significant portion of U.S. soybean oil exports are Government-assisted by both concessional and commercial export programs. Of the total U.S. soybean oil exports from FY 1965 through FY 1977, about 45 percent were exported under the concessional loan and donation programs of Public Law 480. From FY 1978 through FY 1988, the PL 480 share declined to about 30 percent.

Commercial export programs also have played a role in soybean oil exports in recent years. Almost 18 percent of FY 1978-88 exports were made under the Commodity Credit Corporation's (CCC) short-term credit guarantee program, GSM-102. Exports under GSM-102 rose in FY 1988 to about 40 percent of total soybean oil exports. Under GSM-102, importers of soybean oil have up to 3 years to repay their loans at commercial interest rates. Of the total U.S. soybean oil exports from FY 1987 through FY 1988, about 15 percent were under the export enhancement program (EEP), a commercial export program announced by USDA in 1985. Under the EEP, exporters receive bonuses in the form of generic certificates to help them meet prevailing world prices for targeted commodities and countries.

Policies in Other Exporting Countries

Brazil

Soybeans and soybean products continue to be Brazil's largest source of agricultural export revenues. Over the years, Brazil's soybean industry has been shaped by a myriad of rapidly changing policies: tariffs, export quotas, licenses, price supports, currency adjustments, and export subsidies. The principal objectives of the government have been to assure domestic supplies at reasonable prices, expand crushing capacity at a moderate rate, and increase export earnings of soybean meal and oil. The annual crushing capacity in Brazil, around 29 million tons, exceeds the expected record 1988/89 crop of 22 million tons.

Brazil has maintained an aggressive marketing stance since the early 1970's with the use of selected policies to enhance exports of soybean meal and oil. These have included:

(1) A drawback system which initially provided attractive financing to import soybeans for domestic processing and re-export as final products; however, no preferential financing is available at the present time.

(2) Differential taxes levied by individual states to discourage exports of raw commodities such as soybeans, thus favoring processed products.

(3) Registration requirements imposed by CACEX (government agency which controls exports) to restrict exports, especially of soybeans, to assure supplies to crushers, and occasionally of soybean oil, to prevent domestic prices from rising too rapidly.

Table 11—World soybean oil exports, major exporters and regions, 1964–89

Crop year [1]	United States	Brazil and Argentina	EC–12 [2]	Other countries			World
				Developed	Developing	Centrally planned	
			1,000 metric tons				
1964/65	608	0	115	28	25	3	779
1965/66	419	0	112	26	18	4	579
1966/67	488	0	148	28	6	6	676
1967/68	437	0	150	23	11	8	629
1968/69	395	0	240	20	15	14	684
1969/70	644	3	395	37	21	7	1,107
1970/71	790	7	461	54	37	16	1,365
1971/72	634	38	454	50	22	13	1,211
1972/73	484	104	490	27	15	17	1,137
1973/74	651	49	718	28	9	9	1,464
1974/75	466	340	721	14	3	1	1,545
1975/76	443	497	749	6	8	5	1,708
1976/77	702	624	814	10	8	3	2,161
1977/78	933	581	1,154	10	8	5	2,691
1978/79	1,059	561	1,253	20	13	6	2,912
1979/80	1,220	897	1,323	46	44	1	3,531
1980/81	740	1,296	1,299	38	59	2	3,434
1981/82	942	1,093	1,489	34	76	1	3,635
1982/83	918	1,245	1,472	46	85	3	3,769
1983/84	827	1,424	1,569	35	84	6	3,945
1984/85	753	1,479	1,302	26	48	9	3,617
1985/86	570	1,062	1,388	27	73	4	3,124
1986/87	538	1,775	1,439	20	217	1	3,990
1987/88	850	1,641	1,228	37	176	33	3,965
1988/89 [3]	646	1,850	977	20	190	1	3,684
1989/90 [4]	635	1,950	1,000	23	215	1	3,824

[1] Based on aggregate of differing local marketing years.
[2] Includes intra-EC trade.
[3] Preliminary.
[4] Forecast.
Source: U.S. Department of Agriculture, Foreign Agricultural Service, Oilseeds and Products Division: production, supply, and distribution database, August 1989.

(4) Subsidized credit, for exporters and processors, substantially below market interest rates.

In recent years, in response to International Monetary Fund (IMF) conditions for resolving its debt burden, Brazil has adjusted its subsidized interest rates, narrowing the gap with commercial rates. Also, Brazilian currency has been consistently overvalued. Benefits of export enhancement activities are largely offset by the implicit tax imposed on exporters through Brazil's exchange rate policies.

Argentina

Argentina's exports of oilseeds and products were controlled by the national grain marketing board, Junta Nacional de Granos (JNG), from 1973 to mid-1976. Export taxes were also used to control exports and raise revenues. Quotas were liberalized in the mid-1980's and export taxes were reduced, making Argentina's exports more competitive. The government continues to influence exports of oilseeds and derivative products by requiring exporters to register with the JNG.

In recent years, Argentina has adopted a differential tax program similar to Brazil's to encourage the export of processed products, like soybean meal and oil, instead of soybeans. It has also encouraged crop production by increasing incentives to use fertilizer. Most of the fertilizer had been going to wheat, which benefited soybeans because 60 percent of soybeans were double-cropped with wheat. In the main soybean area, farmers are switching from the wheat/soybean double-crop pattern to single-crop soybeans in an effort to achieve better yields of single-crop soybeans and reduce soil erosion. The government of 1976-83 began to liberalize agriculture by reducing agricultural export taxes. But, the reduction in export taxes was only temporary.

Table 12—World soybean oil imports, major importers and regions, 1964-89

Crop year [1]	Iran	India	Pakistan	Other countries			World
				Developed	Developing	Centrally planned	
				1,000 metric tons			
1964/65	28	41	108	241	235	65	718
1965/66	30	33	77	139	212	59	550
1966/67	12	52	28	124	235	83	534
1967/68	29	36	58	135	223	22	503
1968/69	32	84	74	194	276	31	691
1969/70	97	79	118	346	311	44	995
1970/71	95	77	112	393	405	192	1,274
1971/72	117	66	45	283	343	216	1,070
1972/73	93	73	62	322	296	170	1,016
1973/74	179	19	118	570	476	121	1,483
1974/75	148	4	63	518	573	190	1,496
1975/76	219	53	102	527	512	174	1,587
1976/77	165	438	97	541	685	224	2,150
1977/78	313	511	206	620	759	258	2,667
1978/79	215	553	277	636	971	266	2,927
1979/80	248	628	208	671	1,077	278	3,111
1980/81	322	639	214	629	1,102	452	3,364
1981/82	285	460	291	744	1,359	389	3,534
1982/83	346	537	306	682	1,337	496	3,704
1983/84	331	808	301	743	1,526	296	4,005
1984/85	382	398	189	672	1,258	555	3,454
1985/86	325	256	320	682	1,149	391	3,123
1986/87	420	363	189	692	1,308	775	3,747
1987/88	410	419	402	750	1,420	363	3,764
1988/89 [2]	430	50	450	697	1,327	509	3,463
1989/90 [3]	440	125	500	694	1,483	533	3,775

[1] Based on aggregate of differing local marketing years.
[2] Preliminary.
[3] Forecast.
Source: U.S. Department of Agriculture, Foreign Agricultural Service, Oilseeds and Products Division: production, supply, and distribution database, August 1989.

The current government (since July 1989) is phasing in reforms to control inflation, stabilize the economy, and establish the appropriate conditions for longer term growth. These measures include: reduce currency transactions, devaluate currency to establish exchange rates favorable for exports, reduce deficit spending through privatization of some government-owned transportation and communication enterprises, and phase in reduction of taxes on agricultural exports by one-half to two-thirds by July 1990.

EC-12

EC oilseed production has jumped tenfold in the last decade, primarily from improved varieties (particularly of rapeseed), which boosted yields, and high oilseed support prices, which encouraged oilseed planting. Support prices for oilseeds were raised to reduce EC dependence on imported oilseeds and to shift some grain area into oilseeds. Support prices for EC soybeans, sunflower, and rapeseed rose sharply in the late 1970's and early 1980's and have remained relatively stable since then. The EC passed a provision to cut support prices if production exceeds established thresholds, which happened in 1987/88 and 1988/89, and is forecast to happen for soybeans and rapeseed in 1989/90.

Although still the world's largest importer of oilseeds and oilseed products, the EC is rapidly increasing its self-sufficiency in vegetable oils, as well as becoming a significant exporter of some oils. The EC imports about two-thirds of its oilseed meal requirements, down from 90 percent 5 years ago, and U.S. oilseeds make up about half the EC imports.

The growth in EC oilseed production has produced increasingly large budget outlays for price subsidies and export aid, hence the recent stabilization of support prices and establishment of production thresholds. Export refunds and intervention purchases are also part of oilseed budget expenditures, but the majority of oilseed outlays are for crushing subsidies, which are passed through to producers. In 1986, EC expenditures on oilseeds alone totaled $2 billion, 9 percent of total agricultural support outlays (Normile).

Prospects in Importing Countries

Growth in per capita consumption of livestock products and vegetable oils has slowed in many of the industrialized countries of Western Europe, North America, and Oceania. This, coupled with expected low or negative population growth rates and a slower increase in real income over the next decade, probably will slow demand for protein meals and vegetable oils in these markets. Meal demand in the EC is already down. European oilseed imports would be further affected by implementation of repeatedly proposed vegetable oil taxes and other restrictions by the EC to discourage consumption of imported oils.

Per capita consumption of oilseed meal and oil in developing countries and centrally planned countries is low compared with that of industrial countries, and thus is expected to rise in response to rising incomes and expanding livestock industries. A number of these countries are now burdened with large foreign debts, which could slow the rate of import expansion. The EC has a transportation advantage to East European and USSR markets and has been increasing soybean meal exports in recent years.

The USSR's new program of *Perestroika* (restructuring) includes the element of higher per capita meat consumption. Accordingly, USSR imports of soybean meal in calendar 1987 were up dramatically over the previous 3 years, and included imports of U.S. soybean meal for the first time since 1979 (Bickerton). USSR imports of 1.3 million tons of U.S. soybean meal in FY 1988 comprised 21 percent of U.S. soybean meal exports. By August 17, 1989, export sales of 1.3 million tons to the USSR constituted 30 percent of U.S. soybean meal sales. Continued large USSR imports of soybean meal would strengthen demand for either U.S. soybean meal or soybeans, if Soviet purchases of EC soybean meal rise, because most EC soybean imports are from the United States.

History of Soybean Programs

The first Government involvement in soybeans came under the Soil Conservation and Domestic Allotment Act of 1936. Soybeans harvested for grain, hay, or seed were classified as soil-depleting, while soybeans left on land or turned under for green manure were soil-building. Farmers who participated in the soil conservation program received direct payments if they reduced acreage of soil-depleting crops, increased acreage of soil-building and soil-conserving crops, and used practices to control soil erosion.

A price support program for soybeans was implemented in 1941, with a loan rate of $1.05 per bushel. A price support loan for soybeans has been in effect every year since then, except for 1975 when economic conditions indicated that support loans would not be necessary to encourage production.

Programs in the 1950's and 1960's

Price support loans were not mandated by farm legislation throughout this period, but were authorized at the discretion of the Secretary of Agriculture. Market prices averaged above support levels and there was only a minimum of loan activity.

There were no allotments or marketing quotas for soybeans, as there were for wheat, corn, rice, and cotton. Soybean acreage was allowed to expand on land that could not be used for these crops. Soybeans were especially competitive with corn in the Corn Belt and cotton in the Delta. Soybean acreage expanded from 15.6 million acres in 1950 to 23.6 million acres in 1959 (app. table 11). Unlike other major field crops, soybean yields were virtually unchanged, so production increases came almost entirely from acreage expansion.

In January 1959, USDA announced the first soybean reseal program for 1958 farm-stored soybeans, where farmers in designated areas were able to extend farm-storage loans or convert purchase agreements to loans for an additional year following the loan maturity date. The reseal program was offered because: (1) a large quantity of soybeans was placed under support (over 44 million bushels) from the record 1958 crop (app. table 3), and (2) commercial storage was in short supply because of record grain supplies. The reseal program was also used for the 1961, 1963, and 1966-69 crops. For the 1967-69 crops, commercially stored soybeans, as well as farm-stored, could be resealed. This program was especially effective for the 1961 and 1963 crops when 22 million bushels were resealed and only about 3.4 million bushels were eventually forfeited to the CCC.

Soybean acreage increased through the 1960's, but so did demand (see table 3 for domestic crush and exports). Policymakers encouraged a shift in acreage away from crops with chronic oversupply problems to soybeans. In 1961, soybeans eligible for support were restricted to farms where the 1959-60 average acreage of land had been maintained either in conserving uses or idle. The purpose was to encourage soybean production on land that would otherwise be used for crops in surplus. To increase soybean production, the 1966 feed grain program was revised to provide support payments to feed grain program participants who voluntarily planted soybeans on feed grain acreage.

Programs in the 1970's and 1980's

The Agricultural Act of 1973 gave farmers greater freedom to shift between soybeans and other crops. Farmers were allowed to plant soybeans on allotted acreages of other program crops and maintain their allotment history for those crops. The loan and purchase agreement (price support loan) program for soybeans was legislatively mandated for the first time under the Food and Agriculture Act of 1977. The Agriculture and Food Act of 1981 and the Food Security Act of 1985 also mandated the price support loan program for soybeans. Soybean producers remain exempted from acreage reduction provisions as a condition for price support eligibility.

The 1985 Act established the loan rate at $5.02 per bushel for soybeans. For the 1988-90 crops, the loan rate will be 75 percent of the simple average of prices received by farmers over the preceding 5 marketing years, excluding the high and low years, with a minimum of $4.50 per bushel. However, the support price cannot be reduced by more than 5 percent in any year. If the loan rate is considered to discourage exports and cause excessive stocks, the loan rate may be reduced by the Secretary up to an additional 5 percent in any year, but not below $4.50 per bushel.

The 1985 Act also gives the Secretary discretionary authority to offer a soybean marketing loan. If implemented, a marketing loan would allow soybean producers to repay their nonrecourse loans at the adjusted world market price, when world prices are below the loan rate. The Secretary chose not to implement a marketing loan for the 1986-89 crops of soybeans.

The Disaster Assistance Act of 1988 was passed in response to the 1988 drought. This legislation requires that the Secretary permit producers to plant soybeans on 10-25 percent of their 1989 permitted acreage of wheat, feed grains, cotton, and rice. However, the Secretary must limit plantings of soybeans and sunflowers so that market prices of soybeans do not fall below 115 percent of the basic loan rate in the previous year. The Secretary allowed 80 percent of the requested acreage to be planted in soybeans in 1989, up to a maximum of about 2.8 million acres. The provision may be extended to the 1990 crop if there is an insufficient supply of soybeans.

Soybean Program Effects

Government commodity programs affect producers, consumers, and taxpayers. Other Government programs, including PL 480 and the conservation reserve program, indirectly affect soybean production and prices.

Producers

Under the loan program, all producers have the option of placing soybeans under Government loan and receiving the loan support rate. These loans can be redeemed prior to maturity and the soybeans sold on the cash market. If producers do not redeem their loans, the soybeans become Government property. Nonredemption occurs more frequently in years when soybean cash prices are near or below the support rate. Nonredemption takes soybeans off the market and keeps cash prices from falling further below the support rate.

During the past 37 years, the soybean loan rate has exceeded the average market price only five times (app. table 3). The primary benefit of the soybean program for producers has been to allow them to obtain cash at harvest time through the loan program, while allowing them to retain control over the soybeans and market them throughout the year.

Consumers

When surplus soybeans were placed under extended loan, consumers paid somewhat more for meat and edible vegetable oil products than they would have if no soybean price support program existed. These consumer costs were partially offset by the Government's reseal program during years when cash prices were low relative to the support rate, whereby producers could extend their loans. Loans usually could be extended until the cash price was above the support rate; the Government did not have to take heavy support loan deliveries. When prices rose and soybeans were redeemed, they added to existing supplies and probably lowered prices slightly, resulting in a savings to consumers. The net cost to consumers of the soybean program has been minor.

Even if prices of soybean products were 10 percent higher because of the price support loan program, the impact on consumer prices would be small. A 10-percent increase in the soybean meal price would increase production costs for feeding livestock and poultry by only a few percent. The effect on consumers would be less than that on meat and poultry producers. A large proportion—sometimes more than half—of the retail dollar spent on meat and poultry products is not affected by production costs but rather by processing, wholesaling, and retailing costs.

The consumer effects of a 10-percent increase in soybean oil prices on margarine, salad and cooking oils, and vegetable shortening would also be minor.

Although soybean oil is the major ingredient in these end products, the farmers' shares of these products were only about 39 percent, 34 percent, and 46 percent, respectively, in the mid-1970's (ERS no longer calculates farm-to-retail price spreads for these products).

Taxpayers

The effects of the soybean program on CCC outlays have been minimal over the last three decades compared to most other program crops. Net price support and related expenditures by the Government for soybeans averaged about $4.1 million per year for fiscal years 1982-88 (table 13), so the cost per bushel was insignificantly small.

Indirect Effects of Other Crop Programs

Nearly two-thirds of the farmers harvesting soybeans are cash grain farmers. Major cash grains grown in rotation with soybeans include corn, sorghum, and wheat. Although the direct effects of the soybean program are minimal, soybean producers are affected by other Government programs, especially those relating to cash grains. Price supports, paid land diversion, and set-asides for corn, cotton, sorghum, and wheat affect soybean acreage because those crops compete with soybeans for the same resources (Crowder).

Deficiency payments (difference between the target price and the loan rate multiplied by a farm's program yield) can be made to farmers participating in the wheat, rice, feed grain, and cotton programs under the 1985 Act. High target prices relative to loan rates for grain and cotton have made Government-supported returns for those crops higher than market returns to soybeans. What effect does this have on soybean acreage? The Government has provided a strong incentive for program participation by farmers growing grains and cotton. Hence, farmers plant fewer soybeans (Glauber, 1988b). Soybean producers do not face acreage reduction requirements like those farmers do, but the acreage controls affect soybeans because they cannot be planted on land idled by other crop programs.

The conservation reserve program is another important program set up under provisions of the 1985 Act. Farmers agree to take cropland out of production for 10 years in return for annual rental payments, and to place the land in conserving uses such as perennial grasses or trees. By the end of 1988, the reserve had removed approximately 28.1 million acres of highly erodible crop-

land from production, with an ultimate goal of 40-45 million acres by the end of 1990. This and other provisions that increase prices of competing commodities and remove available cropland from production will tend to reduce soybean acreage and maintain higher soybean prices.

PL 480 provides an additional outlet for soybean oil. A large share of U.S. soybean oil exports come under this program. Exports under PL 480 have increased in the 1980's because of sluggish markets and financial difficulties facing many importers. About 89 percent of U.S. soybean oil exports during FY 1988 were supported by PL 480, the export enhancement program, and the GSM-102 export credit guarantee program. The soybean producer benefits from the PL 480 and other export assistance programs to the extent that they can strengthen soybean oil prices or slow their decline during surplus periods and thus strengthen soybean prices.

Current Issues

Production Incentives for Soybeans

Severe drought cut U.S. soybean production in 1988, reducing output to 1,539 million bushels, 384 million bushels less than 1987 and the lowest since 1976 (app. table 11). U.S. soybean yields averaged only 26.8 bushels per acre in 1988, compared with over 32 bushels per acre in years prior and subsequent to the drought.

Soybean production in the Southern United States has declined dramatically in recent years because of falling returns from soybeans in relation to returns from

Table 13—Farm-related program costs for U.S. soybeans, 1961-88 [1]

Fiscal year	Loan operations		Net price support and related expenditures [2]
	Outlays	Repayments	
		Million dollars	
1961	46.1	48.5	-48.7
1962	263.3	105.3	164.3
1963	149.8	111.3	-93.3
1964	154.7	111.1	31.1
1965	64.1	124.6	-88.2
1966	193.1	189.6	3.8 [3]
1967	372.6	220.9	151.6
1968	501.1	266.1	239.0
1969	850.2	358.5	512.7
1970	422.6	439.2	-160.7
1971	321.2	415.9	-606.5
1972	376.0	430.4	-64.9
1973	202.1	222.8	-20.7
1974	278.2	251.6	26.4
1975	78.1	99.9	-21.9
1976 [4]	.7	9.1	-8.4
1977	56.9	52.1	4.8
1978	340.2	309.0	31.1
1979	288.7	284.8	3.5
1980	549.1	485.1	116.0
1981	672.3	581.7	86.7
1982	1,105.9	935.9	169.2
1983	1,981.7	1,674.8	287.7
1984	505.3	944.9	-585.0
1985	1,382.0	675.9	711.4
1986	2,576.3	1,009.0	1,597.4
1987	1,508.0	1,157.0	-475.7
1988	1,282.8	1,644.1	-1,676.0

[1] Excludes PL 480 commodity costs.
[2] Loans and purchases, storage and handling, and other outlays such as transportation, producers' storage payments, loan collateral settlements, export embargo contract expenses less sales proceeds, loan repayments, and other receipts.
[3] Includes $0.4 million commodity export payments.
[4] Includes July to Sept. 1976 to allow shift from July/June to Oct./Sept. fiscal year.
Source: U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service data.