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Soybeans

Background for 1990 Farm Legislation

Brad Crowder
Cecil Davison

U.S. soybean production increased rapidly during the 1960's and 1970's and is projected to continue to grow. While the growth areas for soybeans are primarily in the United States, the United States faces increasing competition from other world markets for soybeans. Soybean meal also competes with other protein meals for livestock feed, and soybean oil competes with substitute oils. Lower 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 has shifted somewhat during the 1980's as well. Although soybeans are relatively free from government price supports, other levels are affected by agricultural programs for other commodities. Soybeans are supported by a price support loan which, in most years, has been used to support soybean issues for legislation in 1990 will probably be related to these issues, the support level, and the acreage base.

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Soybeans: Background for 1990 Farm Legislation. By Brad Crowder and Cecil Davison. Commodity Economics Division, Economic Research Service, U.S. Department of Agriculture. Staff Report AGES 89-41.

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 in world markets for soybeans. Soybean meal also competes with other protein meals for livestock feed, and soybean oil competes with substitutable fats and oils. Lower 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 have shifted somewhat during the 1980's as well. Although soybeans are relatively free from direct Government programs, production levels are affected by agricultural programs for other commodities. 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 center on trade issues, the support level, crop substitution on program crop acreage bases, and a marketing loan for soybeans.

Keywords: Soybeans, protein meal, vegetable oil, farm programs, agricultural trade

Foreword

Congress will soon consider new farm legislation to replace the Food Security Act of 1985. In preparation for these deliberations, the U.S. Department of Agriculture and other groups are studying preceding legislation to see what lessons are applicable to the 1990's. This report updates Soybeans: Background for 1985 Farm Legislation (AIB-472), by Duane Hacklander and Walter Gardiner. It is one of a series of updated and new Economic Research Service background papers for farm legislation discussions. These reports summarize the experience with major commodity programs and key characteristics of those commodities and the farm industries that produce them. For more information, see the Additional Readings at the end of the text.

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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 will affect future foreign demand for U.S. soybeans and, hence, soybean production.

Experience indicates that Government programs, other commodities, 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 as a financial mechanism to obtain funds at harvest time.

The policy questions relating to soybeans in the 1990 farm legislation will probably center on the support level, the efficiency of a marketing loan program for soybeans, and production and export incentives. The Government can be subject to high support 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 hinge on how these issues are resolved in ongoing trade talks and U.S. farm legislation.

Soybeans

Background for 1990 Farm Legislation

Brad Crowder
Cecil Davison

Introduction

The soybean industry is one of the fastest growing agricultural sectors. Domestic production increased over 300 percent during the last 25 years, and world production rose 350 percent. Soybeans accounted for half of the world production of major oilseeds in 1984/85-1988/89. With a projected farm value of \$11.3 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. U.S. dominance of world exports eroded as well. Soybean acreage dropped about 20 percent between 1979 (71.4 million acres) and 1987 (57.4 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 62 percent of the 511,000 soybean farms in 1982, ranging from 39 percent of the farms in the Delta to 75 percent of the farms in Appalachia (table 1). The proportion of farms with 250 or more acres of soybeans was largest in the Delta

and Southern Plains. The average harvested soybean acreage per farm increased from 114 acres to 127 acres from 1978 to 1982.

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.

Over 65 percent of U.S. soybean farmers received half or more of their total sales of agricultural products from cash grains. The percentage increased as soybean acres per farm rose: 52 percent on farms with 1-24 harvested soybean acres, 64 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 is illustrated in 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 improved yields, but limited knowledge about the genetic structure of soybeans has delayed development of high-yielding varieties. Genetic

Table 1--Distribution of soybean farms, by acres of soybeans harvested, 1982

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	
	<u>Percent 1/</u>							<u>Number</u>
Corn Belt	18.4	18.8	23.0	28.3	9.1	2.1	0.3	260,171
Appalachia	37.0	20.6	17.2	15.5	6.2	2.6	.9	60,656
Lake States	20.8	20.3	24.0	26.6	6.7	1.4	.2	59,439
Northern Plains	17.5	21.6	26.1	26.3	6.7	1.4	.2	48,935
Southeast	23.6	18.2	18.3	21.9	11.0	5.2	1.7	35,223
Delta	12.5	12.3	13.8	21.1	18.8	14.2	7.4	30,485
Southern Plains	12.8	20.0	20.3	28.7	14.4	6.7	2.2	5,061
United States	21.2	19.0	21.7	25.3	8.9	3.0	.9	511,229

1/ Totals may not add to 100 percent due to rounding.

Source: 1982 Census of Agriculture.

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

Region	1950-54	1960-64	1970-74	1980-84	1985-88
<u>1,000 acres</u>					
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
<u>Bushels per harvested acre</u>					
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
<u>1,000 bushels</u>					
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.

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. 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 12.1 million acres for 1950-54 to 36.9 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 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. The 1978 Census of Agriculture showed that 79 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, 92 percent harvested soybeans. Most of the production and harvesting equipment for wheat and corn can

also be used for soybeans, making soybeans an important rotation crop. Of the Mississippi farms where cotton is harvested, 73 percent also harvested soybeans.

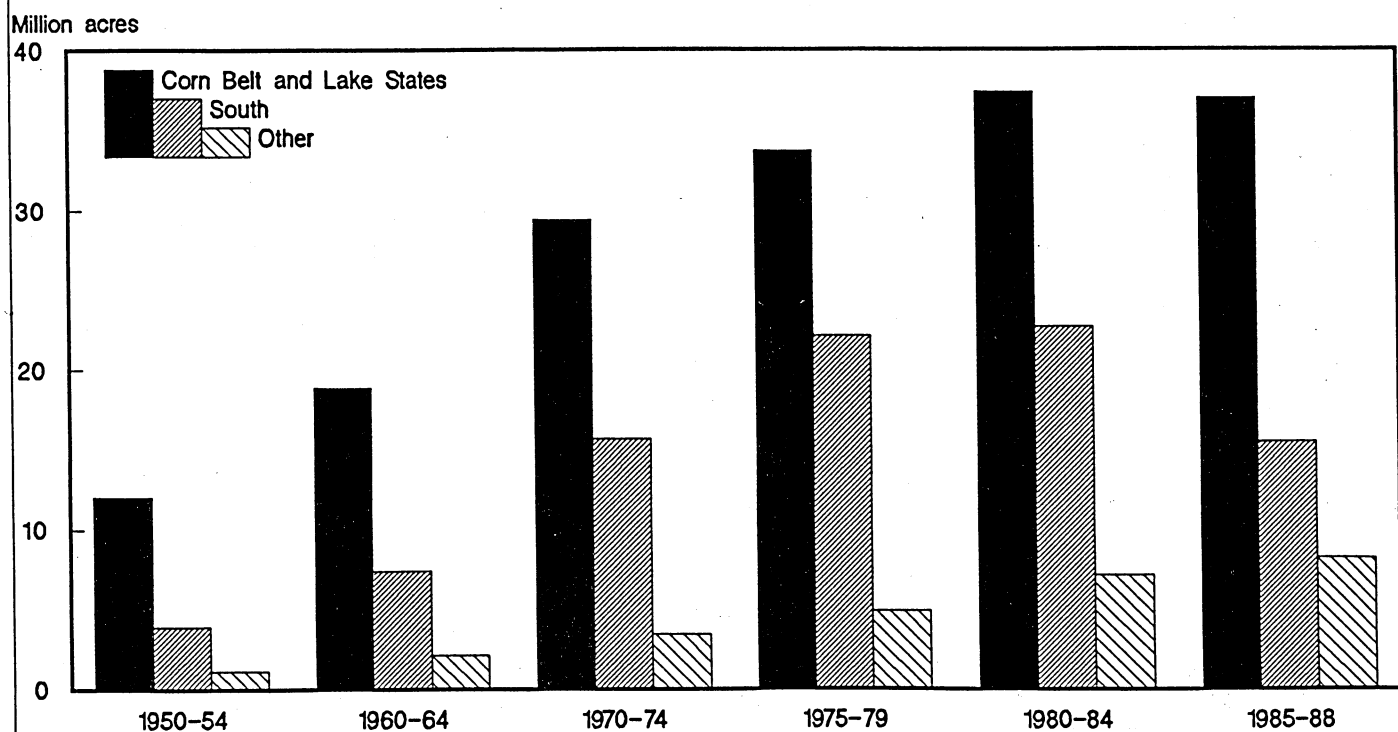
Double-Cropping Soybeans

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).

Figure 1
Planted soybean acreage, by region



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 winter 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 supply and disappearance of soybeans is 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 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. The potential for new industrial uses for soybean oil probably surpasses that in the edible market. Low-cost petroleum products generally dominate industrial oil application at this time, but

Table 3--Use and ending stocks for U.S. soybeans, 1953-89 1/

Year beginning Sept. 1	Crush	Seed, feed, and residual	Exports	Total use	Ending stocks	Stocks-to- use ratio
- - - - - Million bushels - - - - -						Percent
1953	218	26	40	284	8	2.8
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.

Table 4--Soybean meal supply and disappearance, 1960-89

Year beginning Oct. 1	Supply			Disappearance			Ending stocks <u>1/</u>
	Stocks <u>1/</u>	Production	Total	Exports	Domestic	Total	
<u>1,000 short tons</u>							
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 <u>2/</u>	153	24,897	25,050	5,250	19,500	24,750	300
1989 <u>3/</u>	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--Soybean oil supply and disappearance, 1960-89

Year beginning Oct. 1	Supply			Disappearance			Ending stocks
	Stocks	Production	Total	Exports	Domestic	Total	
<u>Million pounds</u>							
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	<u>1/</u> 1,640	9,917	11,557	632
1985	632	11,617	12,249	<u>1/</u> 1,249	10,053	11,302	947
1986	947	12,783	13,730	<u>1/</u> 1,172	10,833	12,005	1,725
1987	1,725	12,974	14,895	<u>1/</u> 1,677	10,930	12,803	2,092
1988 <u>2/</u>	2,092	11,648	13,890	<u>1/</u> 1,275	10,400	11,825	2,065
1989 <u>3/</u>	2,065	12,275	14,370	<u>1/</u> 1,370	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.

nonpetroleum fats and oils are being used in the production of alkyd resins, epoxidized oils, surfactants, and plasticizers.

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. Fluctuations in soybean supply and demand cause variability in processors' crushing margins.

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 increase, while the protein and meal content tends to decrease, as soybeans are grown in progressively warmer climates. 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,

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

Crop year	Value of production	Total cash expenses <u>1/</u>	Return above cash expenses <u>2/</u>		
			Total	Nominal	Deflated
- - - - - <u>Billion dollars</u> - - - - -			<u>Dollars per bushel</u>		
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 total income and total cash expenses; this difference was divided by the quantity produced and was then deflated. (1982 = 1.0).

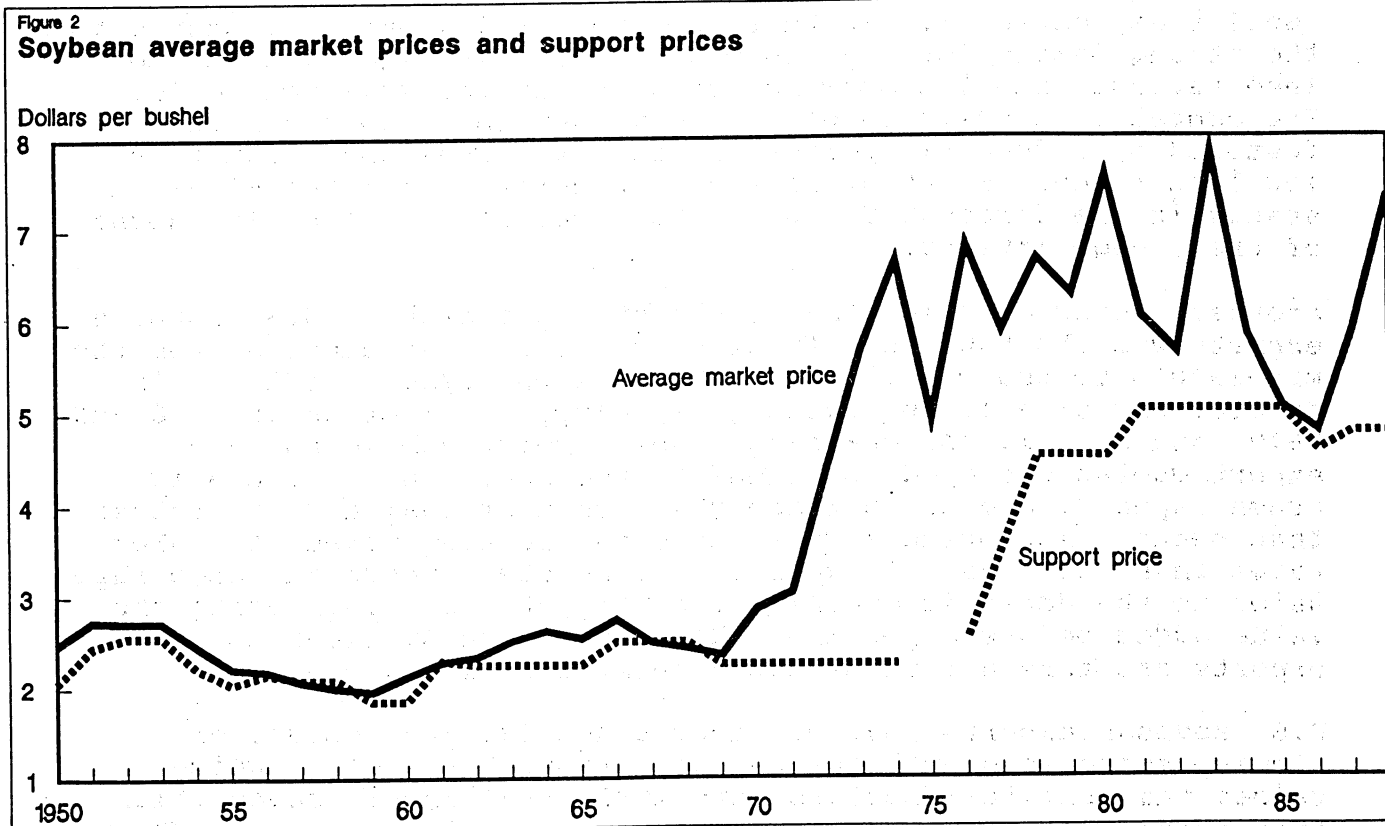
Source: U.S. Department of Agriculture, Economic Research Service, Economic Indicators of the Farm Sector: Costs of Production, annual issues; and U.S. Department of Agriculture, National Agricultural Statistics Service, Agricultural Prices, annual issues.

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 soybean 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 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 tapering off of 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.

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	
<u>1,000 metric tons</u>								
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.

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 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 the United States, Argentina, 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, 11 percent; 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 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

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

Crop year <u>1</u> /	EC-12 <u>2</u> /	Japan	Other countries		Centrally planned	World
			Developed	Developing		
<u>1,000 metric tons</u>						
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 <u>3</u> /	10,788	4,300	659	6,739	1,270	23,756
1989/90 <u>4</u> /	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.

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	
<u>1,000 metric tons</u>								
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.

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

Crop year 1/ 2/	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.

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

Crop year <u>1/</u>	United States	Brazil and Argentina	EC-12 <u>2/</u>	<u>Other countries</u>			World
				Developed	Developing	Centrally planned	
<u>1,000 metric tons</u>							
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 <u>3/</u>	646	1,850	977	20	190	1	3,684
1989/90 <u>4/</u>	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.

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-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 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

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

Crop year <u>1/</u>	Iran	India	Pakistan	Other countries		Centrally planned	World
				Developed	Developing		
<u>1,000 metric tons</u>							
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 <u>2/</u>	430	50	450	697	1,327	509	3,463
1989/90 <u>3/</u>	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.

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 to 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.
- (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 eliminating differential exchange rates and by reducing agricultural export taxes. But, the reduction in export taxes was only temporary.

The current government is phasing in reforms to control inflation, stabilize the economy, and establish the appropriate conditions for longer term growth. These measures include reduced currency transactions, mixed exchange rates, currency devaluations, and reduced deficit spending.

EC-12

EC oilseed production has grown steadily since the late 1970's and has increased 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 12.5 million acres in 1949 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 Commodity Credit Corporation.

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 1986-88 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 (see 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

In years 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 resale 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 the prices of soybean products were raised 10 percent higher by the price support loan, 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 have been minimal over the last three decades. 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. The soybean loan program has resulted in net revenues to the Commodity Credit Corporation of \$554.3 million during the last 3 years, from interest charges and revenues from soybeans acquired under the nonrecourse loan program, for a net savings of about \$5 per taxpayer under current legislation.

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

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

Fiscal year	<u>Loan operations</u>		Net price support and related expenditures <u>2/</u>
	Outlays	Repayments	
<u>Million dollars</u>			
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	<u>3/</u> 3.8
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 <u>4/</u>	.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 payment.

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.

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 cropland 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 slow the decline or strengthen soybean oil prices 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.

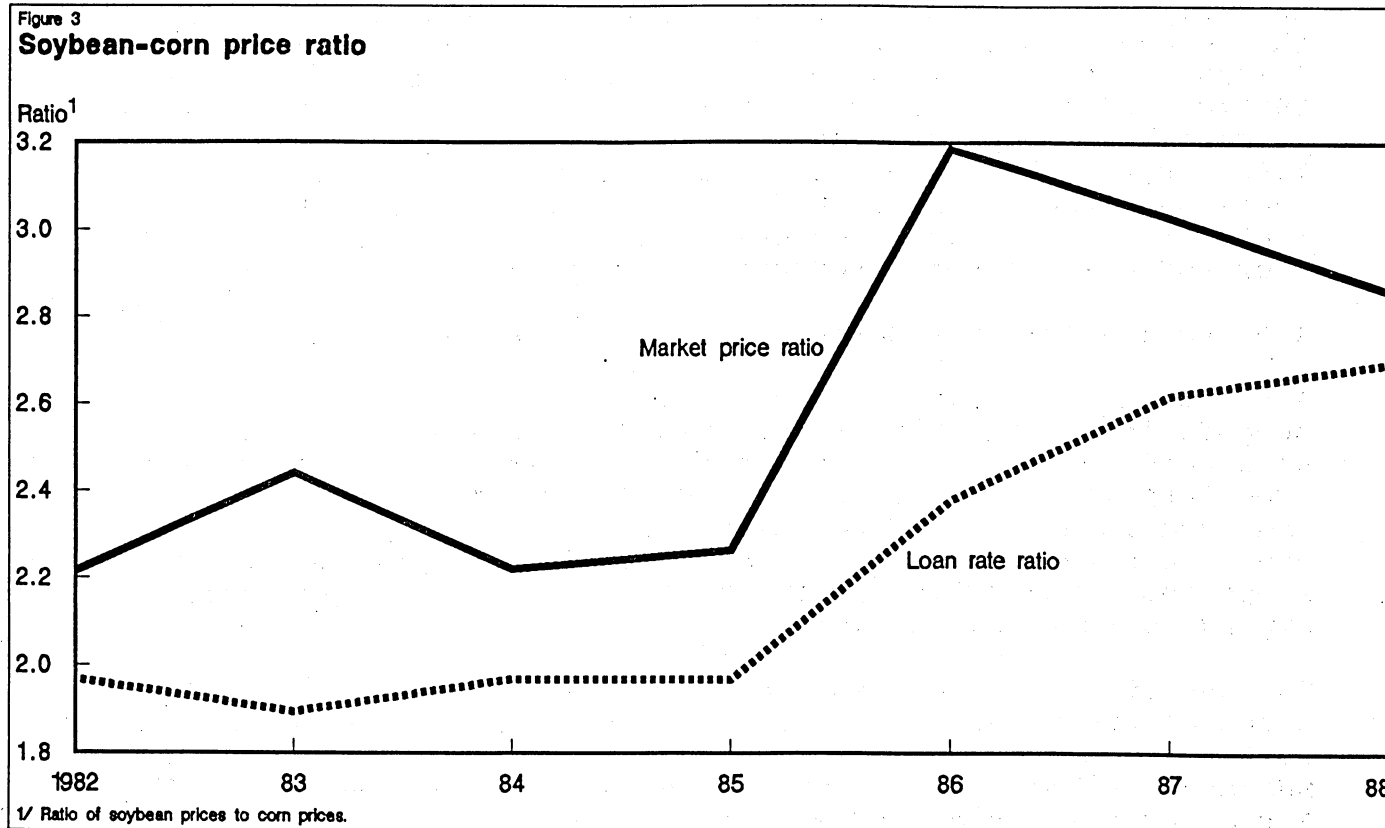
Soybean production in the Southern United States has declined dramatically in recent years because of falling returns from soybeans in relation to returns from competing crops, such as cotton. Drought and disease have depressed soybean yields in the past decade. Cotton yields have risen sharply, further increasing incentives to grow cotton in place of soybeans.

Market prices for corn have declined since 1985 relative to those for soybeans (fig. 3). A marked increase in the soybean-corn price ratio is evident since the passage of the 1985 Act

(1986-89) for both market prices and loan rates. Higher target prices for corn have encouraged corn production at the expense of soybeans and nonprogram crops. (Target prices for corn cannot be compared directly to soybean prices because program considerations such as set-aside requirements and paid land diversion must be considered when comparing crop target prices and market prices. Rather, total returns would have to be compared with target prices for corn versus market prices for soybeans.) Two basic reasons for the change in the corn-soybean price ratio are: (1) price support loan levels for corn have been lowered proportionately more than announced price support levels for soybeans; and (2) massive corn surpluses, accessible through the exchange of Commodity Credit Corporation commodity certificates, have kept market prices for corn relatively lower than they would be otherwise (Glauber, 1988a).

Foreign producers have responded to this higher soybean-corn price ratio by increasing oilseeds plantings. However, U.S. income and price support programs for corn, wheat, and cotton have limited U.S. production responses to higher market prices for soybeans.

Crop acreage base is determined by a moving average of acreage planted in program commodities under current legislation. Therefore, soybeans cannot be planted on a farm's acreage base without sacrificing (1) part of the base for program crops and (2) deficiency payments for current and subsequent years. Deficiency payments for basic commodities make growing those



crops on farm acreage base more profitable than growing soybeans despite higher market prices for soybeans (Glauber, 1988b).

The Disaster Assistance Act of 1988 requires the Secretary to allow producers of basic commodities with a crop acreage base to plant 10-25 percent of their permitted acreage to soybeans or sunflowers. However, additional soybean and sunflower acreage is not allowed to reduce the average market price of soybeans below 115 percent of the previous year's basic loan rate. That market price would be \$5.49 per bushel (115 percent of \$4.77 per bushel) in 1989/90. Producers requested authorization to plant over 3.5 million acres of soybeans on crop acreage bases in the 10-25 signup. The Secretary announced that 80 percent of the soybeans requested by producers could be planted on permitted acreage of 1989 program crops, limiting the maximum acreage to about 2.8 million. Domestic soybean prices are not competitive with 1989/90 target prices for program crops, and soybeans actually planted on permitted acres are considerably less than the maximum authorized by the Secretary.

Program benefits in the 1990 crop year for grains will continue to limit the acreage diverted to soybeans. Upland cotton returns, for both program participants and nonparticipants, are likely to limit soybean plantings on cotton acreage to a small amount.

More double-cropping of wheat and soybeans occurred in the South in 1988/89 due to higher soybean prices and a smaller acreage reduction requirement for winter wheat acreage (Westcott). Some increase in double-cropping of wheat and soybeans is possible if the acreage reduction requirement is continued at a low level for 1989/90 winter wheat, which is expected given relatively low 1988/89 ending stocks of wheat following the drought. Three factors--higher prices for soybeans, the 10-25 provision of the 1988 Act, and lower loan rates and target prices for corn--increased incentives for U.S. farmers to produce soybeans in 1989. Only increased production incentives such as these will increase U.S. soybean production and exports.

A Marketing Loan for Soybeans

A marketing loan would allow producers to repay their price support loans at world prices when world prices are less than announced loan rates. Therefore, a marketing loan should reduce crop forfeitures and reduce Commodity Credit Corporation storage and handling costs. Theoretically, prices of U.S. commodities would be more competitive, incomes of domestic producers would be supported, and foreign producers would be discouraged from expanding their production.

The Secretary did not implement marketing loans for the 1986-88 crops of wheat, feed grains, and soybeans. In accordance with section 14 of the Farm Disaster Assistance Act of 1987, the Secretary submitted a report to the House Committee on Agriculture and the Senate Committee on Agriculture, Nutrition, and Forestry. The report explained why marketing loans were not

implemented for wheat, feed grains, and soybean crops in 1987. According to that report, marketing loans for these crops would have only a moderate effect on domestic use and exports, and other less costly policies lower domestic prices as much as could marketing loans. It was determined that a marketing loan for soybeans could lower domestic prices if world prices were significantly below U.S. prices, but at a substantial cost (Hanthorn and Glauber). World soybean prices generally have been at or above U.S. market prices and loan rates.

Section 301 of the 1988 Act requires the Secretary to submit a statement to the House and Senate agriculture committees discussing the reasons for and against implementing a marketing loan for the 1989 and 1990 crops of soybeans. Due to relatively high expected prices in 1989/90, a marketing loan is not likely to be implemented for the 1989 soybean crop. If implemented, it would not change the relative profitabilities and, therefore, production and marketing of soybeans. A marketing loan could be considered as a mechanism to encourage U.S. production and exports of soybeans, if U.S. loan rates exceed adjusted world prices. U.S. loan rates are not likely to exceed world prices through the 1990/91 marketing year, the final year covered under 1985 farm legislation.

International Issues Affecting Oilseeds

Proposals for reducing trade-distorting agricultural policies are a focus of current GATT multilateral trade negotiations, which include 105 participating nations. If trade barriers and price supports are lowered through the negotiations, heavily subsidized oilseed producers could reduce output and import more oilseeds. The magnitude of these adjustments would depend on relative price changes among oilseeds and grains. Increased import demand could accommodate more exports from lower cost oilseed producers, such as Argentina, the United States, and Brazil. Soybean production and exports would likely increase for all three of these major soybean exporters. U.S. and Argentine sunflower producers could also increase production and exports in response to trade liberalization. Canada could increase rapeseed production and exports of rapeseed and rapeseed oil.

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Glossary

Acreage reduction program (ARP) -- A voluntary land retirement system in which farmers must idle a portion of their base acreage; the remaining base acreage must be planted in the base crop. Farmers must participate to be eligible for benefits like Commodity Credit Corporation loans and deficiency payments.

Agricultural inputs -- Components of agricultural production, such as land, labor, and the capital needed to acquire other inputs, including machinery, fertilizer, seed, and pesticides.

Agricultural Research Service (ARS) -- A USDA agency that conducts basic, applied, and developmental research of regional, national, or international scope in areas including livestock, plants, food safety, nutrition, and food processing.

Agricultural Stabilization and Conservation Service (ASCS) -- A USDA agency responsible for administering farm price- and income-support programs and some conservation and forestry cost-sharing programs.

Basic commodities -- Six crops (corn, cotton, peanuts, rice, tobacco, and wheat) declared by legislation as price supported commodities.

Cargo preference -- A law that requires a certain portion of goods or commodities financed by the U.S. Government be shipped on U.S. flag ships. The law has traditionally applied to PL 480 and other concessional financing or donation programs.

Cash grain farm -- A farm on which corn, grain sorghum, oats, barley, other small grains, soybeans, or field beans and peas account for at least 50 percent of the value of the products sold.

Census of Agriculture -- A survey taken by the Bureau of Census every 5 years to determine the number of farms, land in farms, crop acreage and production, farm spending, and so forth.

Commodity Credit Corporation (CCC) -- A federally owned and operated corporation within the U.S. Department of Agriculture created to stabilize, support, and protect farm income and prices through loans, purchases, payments, and other operations. All money transactions for agricultural price and income support and related programs are handled through the CCC; the CCC also helps maintain balanced, adequate supplies of agricultural commodities and helps in their orderly distribution.

Concessional sales -- Credit sales of a commodity in which the buyer is allowed more favorable payment terms than those on the open market (such as low-interest, long-term credit).

Conservation practices -- Methods or devices which reduce soil erosion and retain soil moisture, including conservation tillage and grassed waterways.

Conservation reserve program (CRP) -- A major provision of the Food Security Act of 1985 designed to reduce erosion on 40-45 million acres of farmland. Under the program, producers who sign contracts agree to convert highly erodible cropland to approved conservation uses for 10 years. In exchange, participating producers receive annual rental payments and cash or in-kind payments to share up to 50 percent of the cost of establishing permanent vegetative cover.

Conserving uses -- Land idled from production and planted in annual, biennial, or perennial grasses, or other soil conserving crop.

Cost of production -- An amount, measured in dollars, of all purchased inputs, allowances for management, and rent, that is necessary to produce farm products.

Crop acreage base -- The average of the wheat, feed grains, upland and extra long staple (ELS) cotton, or rice acreage on a farm planted for harvest, plus land not planted because of acreage reduction or diversion programs or the conservation reserve during a period specified by law.

Crop rotation -- The practice of growing different crops in recurring succession on the same land usually for the purpose of increasing soil fertility.

Crop year -- The year in which a crop is planted; used interchangeably with marketing year.

Deficiency payment -- A Government payment made to farmers who participate in wheat, feed grain, rice, or cotton programs. The payment rate is per bushel, pound, or hundredweight, based on the difference between the price level established by law (target price) and the higher of the market price during a period specified by law or the price per unit at which the Government will provide loans to farmers to enable them to hold their crops for later sale (loan rate). The payment is equal to the payment rate multiplied by the acreage planted for harvest and then by the program yield established for the particular farm.

Developing countries -- Countries whose economies are mostly dependent on agriculture and primary resources and do not have a strong industrial base.

Direct payments -- Payments in the form of cash or commodity certificates made directly to producers for such purposes as deficiency payments, annual land diversion, or conservation reserve payments.

Disaster Assistance Act of 1988 (PL 100-387) -- The legislation signed into law August 11, 1988, designed to provide \$3.9 billion in relief to farmers and ranchers who suffered losses because of natural disasters during 1988.

Economic Research Service -- A USDA agency responsible for economic data and analyses and social science information needed to develop, administer, and evaluate agricultural and rural policies and programs.

Ending stocks -- Existing supplies of a farm commodity at the end of a marketing year.

Erosion -- The process in which water or wind moves soil from one location to another.

European Community (EC) -- Established by the Treaty of Rome in 1957, also known as the European Economic Community and the Common Market. Originally composed of six European nations, it has expanded to 12. The EC attempts to unify and integrate member economies by establishing a customs union and common economic policies, including the Common Agricultural Policy (CAP).

Exchange rate -- Number of units of one currency that can be exchanged for one unit of another currency at a given time.

Export allocation or quota -- Controls applied by an exporting country to limit the amount of goods leaving that country.

Export credit guarantee program (GSM-102) -- The largest U.S. agricultural export promotion program, functioning since 1982; guarantees repayment of private, short-term credit for up to 3 years.

Export enhancement program (EEP) -- Begun in May 1985 under a Commodity Credit Corporation charter to help U.S. exporters meet competitors' prices in subsidized markets. Under the EEP, exporters are awarded bonus certificates which are redeemable for CCC-owned commodities, enabling them to sell certain commodities to specified countries at prices below those of the U.S. market.

Export subsidies -- Special incentives, such as cash payments, tax exemptions, preferential exchange rates, and special contracts, extended by governments to encourage increased foreign sales; often used when a nation's domestic price for a good is artificially raised above world market prices.

Exports -- Domestically produced goods and services that are sold abroad.

Farm -- A tract or tracts of land, improvements, and other appurtenances available to produce crops or livestock, including fish. The Bureau of the Census defined a farm in 1974 as any place that has or would have had \$1,000 or more in gross sales of farm products.

Farm acreage base -- The annual total of the crop acreage bases (wheat, feed grains, upland cotton, and rice) for a farm, the average acreage planted to soybeans, peanuts, and other approved

nonprogram crops, and the average acreage devoted to conserving uses.

Farm value -- A measure of the return or payment received by farmers calculated by multiplying farm prices by the quantities of farm products equivalent to food sold at retail.

Farm-to-retail price spread -- A measure of all processing, transportation, wholesaling, and retailing charges incurred after products leave the farm.

Feed grains -- Any of several grains most commonly used for livestock or poultry feed, including corn, grain sorghum, oats, and barley.

Food Security Act of 1985 (PL 99-198) -- The omnibus food and agriculture legislation signed into law on December 23, 1985, that provides a 5-year framework for the Secretary of Agriculture to administer various agriculture and food programs.

Foreign Agricultural Service -- A USDA agency responsible for promoting U.S. agricultural exports and administering export assistance programs.

General Agreement on Tariffs and Trade (GATT) -- An agreement originally negotiated in Geneva, Switzerland, in 1947 among 23 countries, including the United States, to increase international trade by reducing tariffs and other trade barriers. The agreement provides a code of conduct for international commerce and a framework for periodic multilateral negotiations on trade liberalization and expansion.

Generic commodity certificates -- Negotiable certificates, which do not specify a certain commodity, that are issued by USDA in lieu of cash payments to commodity program participants and sellers of agricultural products. The certificates, frequently referred to as payment-in-kind (PIK) certificates, can be used to acquire stocks held as collateral on Government loans or owned by the Commodity Credit Corporation.

Gramm-Rudman-Hollings Deficit Reduction Act -- Common name for The Balanced Budget and Emergency Deficit Control Act of 1985 (PL 99-177). The law mandates annual reductions in the Federal budget deficit to eliminate it by 1991. If Congress and the President cannot agree on a targeted budget package for any specific fiscal year, automatic cuts occur for almost all Federal programs.

Gross farm income -- Income which farm operators realize from farming; includes cash receipts from the sale of farm products, Government payments, value of food and fuel produced and consumed on farms where grown, and other items.

Harvested acres -- Acres actually harvested for a particular crop. Usually somewhat smaller at the national level than planted acres because of abandonment due to weather damage or

other disasters or market prices too low to cover harvesting costs.

Highly erodible land -- Land that meets specific conditions primarily relating to its land/soil classification and current or potential rate of erosion. The classifications are used in determining eligibility of land for the conservation reserve program.

Import quota -- The maximum quantity or value of a commodity allowed to enter a country during a specified time period.

International trade barriers -- Regulations imposed by governments to restrict imports from, and exports to, other countries, including tariffs, embargoes, and import quotas.

International Trade Commission (ITC) -- An agency of the U.S. Government established to monitor trade, provide economic analyses, and make recommendations to the President in cases of unfair trade practices.

Loan rate -- The price per unit (bushel, bale, or pound) at which the Government will provide loans to farmers to enable them to hold their crops for later sale.

Marketing loan program -- Authorized by the Food Security Act of 1985, this program allows producers to repay nonrecourse price support loans at less than the announced loan rates.

Marketing quota -- Marketing quotas are used to regulate the marketing of some commodities when supplies are excessive. When marketing quotas are in effect, growers who produce more of a commodity than their farm acreage allotments should yield are subject to marketing penalties on the "excess" production and are ineligible for Government price-support loans.

Marketing year -- Generally, the period from the beginning of a new harvest through marketing the following year.

Multilateral trade negotiations -- Discussions of trade issues involving three or more countries.

National Agricultural Statistics Service (NASS) -- A USDA agency that conducts surveys and publishes reports detailing data on production, stocks, prices, labor, weather, and other information of interest to those associated with agriculture.

Net cashflow -- A financial indicator that measures cash available to farm operators and landlords in a given year; indicates the ability to meet current obligations and provide for family living expenses, and to undertake investments.

Nonrecourse loans -- The major price support instrument used by the Commodity Credit Corporation (CCC) to support the price of feed grains, cotton, peanuts, and tobacco. Farmers who agree to comply with all commodity program provisions may pledge a

quantity of a commodity as collateral and obtain a loan from the CCC. The borrower may elect either to repay the loan with interest within a specified period and regain control of the collateral commodity or default on the loan. In case of a default, the borrower forfeits without penalty the collateral commodity to the CCC.

Oilseeds -- Primarily soybeans, peanuts, cottonseed, sunflower seeds, and flaxseed used for the production of edible and/or inedible oils, as well as high protein meals. Other oil crops are rapeseed, safflower, castor beans, and sesame.

Paid land diversion -- If the Secretary of Agriculture determines that planted acres for a program crop should be reduced, producers may be offered a paid voluntary land diversion. Farmers are given a specific payment per acre to idle a percentage of their crop acreage base. The idled acreage is in addition to an acreage reduction program.

Payment-in-kind (PIK) -- A payment made to eligible producers in the form of an equivalent amount of commodities owned by the Commodity Credit Corporation.

Permitted acreage -- The maximum acreage of a crop which may be planted for harvest. The permitted acreage is computed by multiplying the crop acreage by the permitted acreage percent (announced by the Commodity Credit Corporation each year) minus the diversion acreage (if applicable).

Price support programs -- Government programs that aim to keep farm prices received by participating producers from falling below specific minimum prices.

Producer -- A person who, as owner, landlord, tenant, or sharecropper, is entitled to a share of the crops available for marketing from the farm or a share of the proceeds from the sale of those commodities.

Production expenses -- Total cash outlays for production. Capital expenses are figured on annual depreciation rather than on yearly cash outlays for capital items.

Program crops -- Federal support programs are available to producers of wheat, corn, barley, grain sorghum, oats, rye, extra long staple and upland cotton, rice, soybeans, tobacco, peanuts, and sugar.

Program yield -- The farm commodity yield of record determined by averaging the yield for the 1981-85 crops, dropping the high and low years. Program yields are constant for the 1986-90 crops. The farm program yield applied to eligible acreage determines the level of production eligible for direct payments to producers.

Public Law 480 (PL 480) -- Common name for the Agricultural Trade Development and Assistance Act of 1954, which seeks to expand

foreign markets for U.S. agricultural products, combat hunger, and encourage economic development in developing countries.

Resources -- The available means for production, including land, labor, and capital.

Set-aside -- A voluntary program to limit production by restricting the use of land. When offered, producers must participate to be eligible for Federal loans, purchases, and other payments.

Spot market -- Market in sales contracts for immediate delivery, or delivery within a few days.

Subsidy -- A direct or indirect benefit granted by a government for the production or distribution of a good.

Target price -- A price level established by law for wheat, feed grains, rice, and cotton. Farmers participating in the Federal commodity programs receive the difference between the target price and the higher of the market price during a period prescribed by law or the unit price at which the Government will provide loans to farmers to enable them to hold their crops for later sale (the loan rate).

Tariffs -- Taxes imposed on commodity imports by a government; may be either a fixed charge per unit of product imported (specific tariff) or a fixed percentage of value (ad valorem tariff).

Trade barriers -- Regulations used by governments to restrict imports from, and exports to, other countries including tariffs, embargoes, and import quotas.

Upland cotton -- The predominant type of cotton grown in the United States and in most major cotton producing countries of the world. The staple length of these fibers ranges from about 3/4 inch to 1 1/4 inch, averaging nearly 1 3/32 inches.

World price -- Often refers to the cost, insurance, and freight (c.i.f.) price of a commodity at the principal port of a major importing country or area.

Appendix table 1--Distribution of soybean farms, by value of sales, 1982

Region	Value of sales					Total farms
	\$100,000 or more	\$40,000 to \$99,999	\$20,000 to \$39,999	\$10,000 to \$19,999	Less than \$10,000	
	Percent 1/					Number
Corn Belt	25.3	27.6	17.2	13.2	16.7	260,092
Appalachia	17.6	18.9	16.3	15.6	31.7	60,512
Lake States	24.1	28.4	17.9	12.8	16.7	59,429
Northern Plains	26.1	32.4	19.1	11.8	10.6	48,908
Southeast	21.3	18.5	13.6	14.0	32.7	35,183
Delta	30.6	20.1	12.6	11.5	25.1	30,453
Southern Plains	34.1	26.5	15.2	10.7	13.5	5,045
Other	29.1	18.7	13.6	13.1	25.5	11,336
United States	24.5	25.8	16.7	13.2	19.7	510,958

1/ Totals may not add to 100 percent due to rounding.

Source: 1982 Census of Agriculture.

Appendix table 2--Value comparisons for U.S. soybeans, 1950-88

Year beginning Sept. 1	Loan value		Market value		Market value of U.S. production	
	Nominal <u>1/</u>	Real <u>2/</u>	Nominal <u>1/</u>	Real <u>2/</u>	Nominal	Real <u>2/</u>
	- - - - - Dollars per acre - - - - -				Million dollars	
1950	44	184	53	222	738	3,088
1951	51	205	57	229	773	3,104
1952	53	209	56	220	811	3,193
1953	46	178	49	189	733	2,830
1954	44	167	49	186	841	3,198
1955	41	151	45	166	831	3,066
1956	47	168	47	168	980	3,500
1957	48	166	48	166	1,003	3,459
1958	51	172	48	162	1,160	3,906
1959	44	145	46	151	1,046	3,441
1960	43	139	50	162	1,185	3,835
1961	58	186	57	183	1,544	4,949
1962	55	172	57	179	1,564	4,903
1963	53	164	59	182	1,755	5,417
1964	51	155	60	182	1,836	5,581
1965	55	163	62	183	2,151	6,364
1966	64	183	70	200	2,554	7,297
1967	61	170	61	170	2,434	6,780
1968	67	178	65	172	2,689	7,133
1969	62	156	64	161	2,664	6,693
1970	60	143	76	181	3,215	7,655
1971	62	140	83	187	3,560	8,018
1972	63	135	122	262	5,550	11,936
1973	63	127	158	319	8,787	17,752
1974	53	98	157	290	8,070	14,944
1975	NA	NA	142	239	7,618	12,847
1976	65	103	178	282	8,775	13,906
1977	107	159	180	267	10,392	15,441
1978	132	183	196	271	12,446	17,238
1979	144	183	202	257	14,197	18,062
1980	133	155	201	235	13,607	15,877
1981	151	161	182	194	12,014	12,781
1982	158	158	178	178	12,375	12,375
1983	132	127	205	197	12,808	12,327
1984	141	131	164	152	10,868	10,091
1985	171	154	172	155	10,597	9,530
1986	152	133	159	139	9,274	8,128
1987	161	137	198	168	11,305	9,605
1988 <u>3/</u>	128	105	197	162	11,309	9,292

NA = not applicable. No price support loan was offered in 1975.

1/ Loan rate or average farm price times yield per harvested acre.

2/ GNP implicit price deflator (1982 = 1.0) was used.

3/ Preliminary.

Source: Hacklander and Gardiner (1984) and U.S. Department of Agriculture, Economic Research Service, Foreign Agricultural Service, World Agricultural Supply and Demand Estimates, Aug. 10, 1989.

Appendix table 3--Prices and ending stocks for U.S. soybeans, 1952-89

Year beginning Sept. 1	Ending stocks			Avg. price received by farmers	Loan rate
	CCC owned	Free	Total		
	- - - Million bushels - - -			Dollars per bushel	
1952	2	20	22	2.72	2.56
1953	0	8	8	2.72	2.56
1954	7	16	23	2.46	2.22
1955	0	21	21	2.22	2.04
1956	5	27	32	2.18	2.15
1957	14	29	43	2.07	2.09
1958	44	44	88	2.00	2.09
1959	10	42	52	1.96	1.85
1960	0	27	27	2.13	1.85
1961	43	35	78	2.28	2.30
1962	2	44	46	2.34	2.25
1963	3	64	67	2.51	2.25
1964	0	30	30	2.62	2.25
1965	0	36	36	2.54	2.25
1966	7	83	90	2.75	2.50
1967	29	137	166	2.49	2.50
1968	171	156	327	2.43	2.50
1969	150	80	230	2.35	2.25
1970	3	97	99	2.85	2.25
1971	0	72	72	3.03	2.25
1972	0	60	60	4.37	2.25
1973	0	171	171	5.68	2.25
1974	0	188	188	6.64	2.25
1975	0	245	245	4.92	NA
1976	0	103	103	6.81	2.50
1977	0	161	161	5.88	3.50
1978	0	176	176	6.66	4.50
1979	0	358	358	6.28	4.50
1980	0	313	313	7.57	5.02
1981	1	253	254	6.04	5.02
1982	21	324	345	5.69	5.02
1983	1	175	176	7.83	5.02
1984	4	312	316	5.84	5.02
1985	131	405	536	5.05	5.02
1986 1/	249	187	436	4.78	4.77
1987	7	295	302	5.88	4.77
1988 2/	0	155	155	7.35	4.77
1989 3/	NA	NA	285	4.75-6.00	4.53

NA = not applicable; no price support loan in 1975.

^{1/} Gramm-Rudman-Hollings Deficit Reduction Act reduced effective loan rate to \$4.56 per bushel.

^{2/} Preliminary.

^{3/} Forecast.

Source: U.S. Department of Agriculture, National Agricultural Statistics Service, Agricultural Statistics, annual issues, 1952-88; and U.S. Department of Agriculture, Economic Research Service, Foreign Agricultural Service, World Agricultural Supply and Demand Estimates, Aug. 10, 1989.

Appendix table 4--Major oilseeds: World supply and use, 1985-89

Item	1985/86	1986/87	1987/88	1988/89 1/	1989/90 2/
<u>Million metric tons</u>					
Production:					
Soybean	97.03	98.01	103.35	94.08	107.92
Cottonseed	30.63	27.18	31.14	32.25	30.95
Peanut	19.99	20.39	20.34	22.77	22.88
Sunflowerseed	19.56	19.25	20.57	20.40	21.15
Rapeseed	18.70	19.55	23.23	22.43	21.86
Flaxseed	2.35	2.66	2.26	1.74	2.14
Copra	5.31	4.71	4.32	4.52	4.70
Palm kernel	2.51	2.50	2.69	2.92	3.08
Total	196.08	194.24	207.89	201.09	214.68
Exports:					
Soybean	26.07	28.56	30.05	22.92	25.80
Cottonseed	.28	.24	.32	.26	.31
Peanut	1.37	1.28	1.31	1.29	1.33
Sunflowerseed	1.98	1.81	2.22	1.90	1.30
Rapeseed	3.63	4.58	4.53	4.44	4.20
Flaxseed	.67	.79	.71	.54	.61
Copra	.44	.32	.27	.28	.30
Palm kernel	.12	.12	.12	.12	.12
Total	34.54	37.69	39.52	31.75	33.97
Imports:					
Soybean	27.55	29.23	29.01	23.76	25.50
Cottonseed	.26	.25	.32	.26	.31
Peanut	1.26	1.27	1.24	1.24	1.25
Sunflowerseed	1.89	1.94	2.07	1.92	1.48
Rapeseed	3.65	4.92	4.39	4.41	4.19
Flaxseed	.73	.80	.63	.59	.63
Copra	.38	.32	.27	.32	.29
Palm kernel	.11	.12	.10	.10	.09
Total	35.82	38.84	38.02	32.58	33.75
Crush:					
Soybeans	77.43	85.48	85.24	81.05	88.27
Cottonseed	23.92	21.24	23.82	24.82	24.12
Peanut	10.46	10.89	10.54	12.62	12.33
Sunflowerseed	16.71	16.44	17.63	17.92	18.70
Rapeseed	16.99	18.44	20.88	20.31	20.43
Flaxseed	1.79	1.87	1.77	1.56	1.61
Copra	5.31	4.65	4.28	4.43	4.58
Palm kernel	2.42	2.39	2.70	2.87	3.02
Total	155.04	161.38	166.84	165.57	173.06

Note: Trade and crush are aggregated using individual marketing years, except Argentina and Brazil, which are adjusted to an Oct.-Sept. year.

1/ Preliminary. 2/ Forecast.

Source: U.S. Department of Agriculture, Foreign Agricultural Service, World Oilseed Situation and Market Highlights, FOP 8-89, August 1989.

Appendix table 5--World soybean production, consumption, exports, and ending stocks, 1964-89

Crop year <u>1</u> /	Production	Consumption	Exports	Ending stocks	Stocks-to- use ratio
- - - - - Million metric tons - - - - -					Percent
1964/65	29.24	30.28	6.55	1.62	5.4
1965/66	31.70	31.60	7.59	1.80	5.7
1966/67	36.47	35.06	8.12	3.33	9.5
1967/68	37.77	36.08	7.99	5.42	15.0
1968/69	41.70	38.10	8.68	9.72	25.5
1969/70	42.48	44.70	12.57	7.28	16.3
1970/71	44.28	48.03	12.58	3.60	7.5
1971/72	47.20	48.85	12.91	2.98	6.1
1972/73	49.20	48.71	15.44	2.92	6.0
1973/74	62.41	58.33	18.09	6.20	10.6
1974/75	54.66	54.76	15.58	6.89	12.6
1975/76	65.64	63.28	19.23	9.90	15.6
1976/77	59.48	64.17	19.14	5.78	9.0
1977/78	72.24	71.76	22.34	7.04	9.8
1978/79	77.53	78.30	24.66	7.49	9.6
1979/80	93.55	87.38	29.06	13.13	15.0
1980/81	81.03	84.30	24.54	11.54	13.7
1981/82	86.20	88.02	29.54	9.42	10.7
1982/83	93.57	90.64	28.55	12.23	13.5
1983/84	83.17	86.52	26.37	7.92	9.2
1984/85	93.14	89.34	24.91	12.32	13.8
1985/86	97.03	92.74	26.10	18.11	19.5
1986/87	98.01	101.61	28.50	15.40	15.2
1987/88	103.35	104.46	30.37	12.39	11.9
1988/89 <u>2</u> /	94.08	99.23	23.02	7.97	8.0
1989/90 <u>3</u> /	107.92	104.63	25.80	10.94	10.5

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.

Appendix table 6--World and U.S. soybean production, exports, ending stocks, and U.S. share, 1964-89

Crop year <u>1/</u>	Production			Exports			Ending stocks	
	World	United States	U.S. share	World	United States	U.S. share	World	United States
	Million - bushels -	Percent		Million - bushels -	Percent		Million - bushels -	
1964/65	1,074	701	65.2	241	212	88.2	60	30
1965/66	1,165	846	72.6	279	251	89.8	66	36
1966/67	1,340	928	69.3	299	262	87.6	122	90
1967/68	1,388	976	70.4	294	267	90.8	199	166
1968/69	1,532	1,107	72.2	319	287	90.0	357	327
1969/70	1,561	1,133	72.6	462	433	93.7	267	230
1970/71	1,627	1,127	69.3	462	434	93.9	132	99
1971/72	1,734	1,176	67.8	474	417	87.9	110	72
1972/73	1,808	1,271	70.3	567	479	84.5	107	60
1973/74	2,293	1,548	67.5	665	539	81.1	228	171
1974/75	2,008	1,216	60.6	572	421	73.5	253	188
1975/76	2,412	1,548	64.2	707	555	78.6	364	245
1976/77	2,185	1,289	59.0	703	564	80.2	212	103
1977/78	2,654	1,767	66.6	821	700	85.3	259	161
1978/79	2,849	1,869	65.6	906	739	81.6	275	176
1979/80	3,437	2,261	65.8	1,068	875	82.0	482	358
1980/81	2,977	1,798	60.4	902	724	80.3	424	313
1981/82	3,167	1,989	62.8	1,085	929	85.6	346	254
1982/83	3,438	2,190	63.7	1,049	905	86.3	449	345
1983/84	3,056	1,636	53.5	969	743	76.7	291	176
1984/85	3,422	1,861	54.4	915	598	65.3	453	316
1985/86	3,565	2,099	58.9	959	741	77.2	666	536
1986/87	3,601	1,940	53.9	1,047	757	72.3	566	436
1987/88	3,797	1,923	50.6	1,116	802	71.9	455	302
1988/89 <u>2/</u>	3,457	1,539	44.5	846	530	62.7	293	155
1989/90 <u>3/</u>	3,965	1,905	48.0	948	575	60.6	402	285

1/ Based on aggregate of differing local marketing years.

2/ Preliminary.

3/ Forecast.

Source: Converted to bushels from data in U.S. Department of Agriculture, Foreign Agricultural Service, Oilseeds and Products Division: production, supply, and distribution database, August 1989.

Appendix table 7--Soybean production and exports, by foreign exporters,
1964-89

Crop year 1/	Brazil		Argentina		Total foreign	
	Production	Exports	Production	Exports	Production	Exports
<u>Million bushels</u>						
1964/65	19	3	1	0	373	28
1965/66	22	4	1	0	319	28
1966/67	26	11	1	0	412	37
1967/68	24	2	1	0	412	27
1968/69	39	11	1	0	425	32
1969/70	55	11	1	0	428	29
1970/71	76	8	2	0	500	28
1971/72	135	38	3	0	558	57
1972/73	184	66	10	0	537	88
1973/74	289	105	18	0	746	125
1974/75	363	129	18	0	792	152
1975/76	413	122	26	4	863	151
1976/77	460	95	51	23	897	139
1977/78	351	24	99	72	887	120
1978/79	376	23	136	102	980	167
1979/80	557	56	132	100	1,177	193
1980/81	558	55	129	80	1,180	177
1981/82	472	29	152	79	1,178	156
1982/83	542	48	154	49	1,248	144
1983/84	571	58	257	115	1,420	226
1984/85	672	127	248	109	1,561	317
1985/86	518	44	268	94	1,467	218
1986/87	636	121	257	47	1,661	290
1987/88	662	111	356	77	1,875	314
1988/89 2/	823	169	243	18	1,918	316
1989/90 3/	772	165	386	92	2,060	373

1/ Based on aggregate of differing local marketing years.

2/ Preliminary.

3/ Forecast.

Source: Converted to bushels from data in U.S. Department of Agriculture, Foreign Agricultural Service, Oilseeds and Products Division: production, supply, and distribution database, August 1989.

Appendix table 8--World soybean trade, annual averages, 1978-82 and 1983-87 ^{1/}

Importers	Exporters											
	United States		Brazil		Argentina		China		Other		Total	
	1978-82	1983-87	1978-82	1983-87	1978-82	1983-87	1978-82	1983-87	1978-82	1983-87	1978-82	1983-87
EC-12 (1,000 metric tons)	11,916	9,600	601	1,744	1,368	1,468	0	1	739	802	14,624	13,615
% of importer's imports	81	71	4	13	9	11	0	0	5	6	100	100
% of exporter's exports	55	46	61	83	60	68	0	--	61	71	55	50
Japan (1,000 metric tons)	4,085	4,321	8	136	10	6	135	300	29	44	4,267	4,804
% of importer's imports	96	90	--	3	--	--	3	6	1	1	100	100
% of exporter's exports	19	21	1	7	--	--	82	29	2	4	16	18
Taiwan (1,000 metric tons)	1,054	1,551	0	0	0	0	0	0	0	34	1,055	1,585
% of importer's imports	100	98	0	0	0	0	0	0	0	2	100	100
% of exporter's exports	5	7	0	0	0	0	0	0	0	3	4	6
USSR (1,000 metric tons)	708	573	204	26	410	272	0	389	10	15	1,332	1,273
% of importer's imports	53	45	15	2	31	21	0	31	1	1	100	100
% of exporter's exports	3	3	21	1	18	13	0	38	1	1	5	5
Mexico (1,000 metric tons)	660	1,291	114	67	128	103	0	0	1	3	903	1,465
% of importer's imports	73	88	13	5	14	7	0	0	--	--	100	100
% of exporter's exports	3	6	12	3	6	5	0	0	--	--	3	5
South Korea (1,000 metric tons)	453	840	0	24	0	0	0	2	4	4	457	870
% of importer's imports	99	97	0	3	0	0	0	--	1	--	100	100
% of exporter's exports	2	4	0	1	0	0	0	--	--	--	2	3
Other (1,000 metric tons)	2,859	2,615	54	95	367	320	30	326	430	225	3,740	3,581
% of importer's imports	76	73	1	3	10	9	1	9	11	6	100	100
% of exporter's exports	13	13	6	5	16	15	18	32	35	20	14	13
Total (1,000 metric tons)	21,736	20,792	981	2,091	2,284	2,169	164	1,017	1,213	1,126	26,378	27,196
% of importer's imports	82	76	4	8	9	8	1	4	5	4	100	100
% of exporter's exports	100	100	100	100	100	100	100	100	100	100	100	100

-- = Less than 0.5 percent.

^{1/} For example, the EC-12's 1978-82 average annual imports of 11.9 million tons of soybeans from the United States (column 1, row 1) represented 81 percent of the EC-12's total soybean imports (column 1, row 2) and 55 percent of total U.S. soybean exports (column 1, row 3). Percentages may not add because of rounding.

Source: United Nations. Commodity Trade Statistics, 1962-87. Calendar year commodity import data reported to the United Nations, edited and expanded by Arthur B. Mackie, Agriculture and Trade Analysis Division, Economic Research Service, U.S. Department of Agriculture, to include nonreporting countries.

Appendix table 9--Major protein meals: World supply and use, 1985-89

Item	1985/86	1986/87	1987/88	1988/89 1/	1989/90 2/
<u>Million metric tons</u>					
Production:					
Soybean	61.06	67.22	67.61	63.92	69.89
Cottonseed	11.10	9.85	11.23	11.60	11.25
Rapeseed	10.26	11.13	12.62	12.37	12.36
Sunflowerseed	7.66	7.54	8.02	8.21	8.48
Fish	6.33	6.04	6.43	6.56	6.57
Peanut	4.23	4.41	4.28	5.15	5.01
Copra	1.89	1.72	1.53	1.58	1.64
Linseed	1.14	1.19	1.13	1.04	1.03
Palm kernel	1.31	1.28	1.43	1.52	1.61
Total	104.96	110.38	114.28	111.95	117.82
Exports:					
Soybean	23.13	25.96	25.21	25.61	27.55
Cottonseed	.94	.83	.98	1.01	1.00
Rapeseed	1.82	1.69	1.92	1.80	1.90
Sunflowerseed	1.91	1.50	1.59	1.67	1.77
Fish	3.16	3.20	3.17	3.34	3.19
Peanut	.53	.69	.71	.74	.76
Copra	1.34	1.25	1.05	.98	1.09
Linseed	.52	.60	.56	.48	.49
Palm kernel	1.06	.98	1.07	1.16	1.23
Total	34.39	36.68	36.26	36.78	38.99
Imports:					
Soybean	23.92	26.63	25.69	25.97	27.69
Cottonseed	.94	.82	.97	.98	.96
Rapeseed	1.73	2.23	1.98	2.06	1.99
Sunflowerseed	1.89	1.65	1.72	1.60	1.73
Fish	3.24	3.19	3.26	3.30	3.31
Peanut	.52	.71	.75	.78	.79
Copra	1.36	1.25	1.10	1.09	1.10
Linseed	.60	.66	.67	.56	.60
Palm kernel	1.02	1.02	1.22	1.11	1.16
Total	35.22	38.16	37.36	37.44	39.32
Consumption:					
Soybean	61.76	67.67	67.66	64.96	70.01
Cottonseed	11.09	10.01	11.20	11.59	11.21
Rapeseed	10.11	11.58	12.57	12.77	12.43
Sunflowerseed	7.67	7.66	8.18	8.17	8.42
Fish	6.30	6.26	6.28	6.50	6.75
Peanut	4.24	4.37	4.37	5.20	5.03
Copra	1.95	1.78	1.58	1.64	1.64
Linseed	1.21	1.26	1.25	1.12	1.13
Palm kernel	1.27	1.27	1.55	1.43	1.51
Total	105.61	111.88	114.63	113.37	118.13

Note: Trade and crush are aggregated using individual marketing years, except Argentina and Brazil, which are adjusted to an Oct.-Sept. year.

1/ Preliminary.

2/ Forecast.

Source: U.S. Department of Agriculture, Foreign Agricultural Service, World Oilseed Situation and Market Highlights, FOP 8-89, August, 1989.

Appendix table 10--Major vegetable and marine oils: World supply and use,
1985-89

Item	1985/86	1986/87	1987/88	1988/89 <u>1/</u>	1989/90 <u>2/</u>
<u>Million metric tons</u>					
Production:					
Soybean	13.85	15.19	15.27	14.50	15.83
Palm	8.06	7.98	8.39	9.20	9.87
Sunflowerseed	6.65	6.57	7.13	7.20	7.52
Rapeseed	6.23	6.86	7.69	7.55	7.54
Cottonseed	3.47	3.06	3.47	3.60	3.49
Peanut	2.96	3.10	3.00	3.61	3.51
Coconut	3.30	2.93	2.65	2.74	2.84
Olive	1.63	1.56	1.90	1.43	1.77
Fish	1.52	1.34	1.40	1.52	1.46
Palm kernel	1.09	1.07	1.21	1.29	1.35
Linseed	.60	.64	.62	.54	.56
Total	49.34	50.28	52.72	53.17	55.75
Exports:					
Soybean	3.15	3.90	3.77	3.53	3.91
Palm	5.36	5.20	5.49	5.86	6.28
Sunflowerseed	2.19	1.79	2.18	2.05	2.04
Rapeseed	1.31	1.66	1.85	1.77	1.61
Cottonseed	.35	.24	.39	.35	.31
Peanut	.33	.36	.32	.27	.29
Coconut	1.61	1.49	1.39	1.18	1.38
Olive	.37	.55	.46	.45	.49
Fish	.85	.75	.74	.94	.82
Palm kernel	.67	.69	.75	.80	.80
Linseed	.23	.29	.24	.20	.22
Total	16.42	16.89	17.57	17.38	18.16
Imports:					
Soybean	3.09	3.80	3.77	3.50	3.78
Palm	5.42	5.07	5.67	5.80	6.40
Sunflowerseed	2.00	1.79	2.03	1.96	1.98
Rapeseed	1.20	1.41	1.50	1.50	1.30
Cottonseed	.31	.27	.38	.36	.34
Peanut	.30	.33	.37	.33	.32
Coconut	1.52	1.36	1.38	1.27	1.43
Olive	.55	.71	.51	.56	.49
Fish	.82	.79	.74	.83	.81
Palm kernel	.66	.67	.79	.77	.82
Linseed	.20	.26	.20	.21	.21
Total	16.07	16.45	17.31	17.08	17.86
Consumption:					
Soybean	13.50	14.76	15.03	14.67	15.55
Palm	7.69	7.91	8.52	8.78	9.79

See footnotes at end of table.

Continued--

Appendix table 10--Major vegetable and marine oils: World supply and use,
1985-89--Continued

Item	1985/86	1986/87	1987/88	1988/89 <u>1/</u>	1989/90 <u>2/</u>
<u>Million metric tons</u>					
Consumption:					
Sunflowerseed	6.37	6.49	6.99	7.19	7.44
Rapeseed	5.98	6.55	7.17	7.41	7.19
Cottonseed	3.44	3.16	3.44	3.62	3.53
Peanut	2.89	3.08	3.06	3.68	3.53
Coconut	3.04	2.83	2.65	2.84	2.91
Olive	1.77	1.89	1.79	1.76	1.80
Fish	1.42	1.40	1.39	1.49	1.51
Palm kernel	1.05	1.02	1.25	1.26	1.35
Linseed	.56	.60	.58	.54	.56
Total	47.69	49.68	51.88	53.24	55.16

Note: Trade and crush are aggregated using individual marketing years, except Argentina and Brazil, which are adjusted to an Oct.-Sept. year.

1/ Preliminary.

2/ Forecast.

Source: U.S. Department of Agriculture, Foreign Agricultural Service, World Oilseed Situation and Market Highlights, FOP 8-89, August 1989.

Appendix table 11--U.S. soybean acreage, yield, and production, 1950-89

Year	Planted	Harvested	Yield	Production
	- - <u>Million acres</u> - -		<u>Bushels/acre</u>	<u>Million bushels</u>
1950	15.6	13.8	21.7	299.2
1951	15.7	13.6	20.8	283.8
1952	16.4	14.4	20.7	298.8
1953	14.8	16.7	18.2	269.2
1954	18.9	17.0	20.0	341.1
1955	20.0	18.6	20.1	373.7
1956	22.0	20.6	21.8	449.3
1957	22.2	20.9	23.2	483.4
1958	25.3	24.0	24.2	580.3
1959	23.6	22.6	23.5	532.9
1960	24.6	23.7	23.5	555.1
1961	28.0	27.0	25.1	678.6
1962	28.6	27.6	24.2	669.2
1963	29.6	28.6	24.4	699.2
1964	31.7	30.8	22.8	700.9
1965	35.2	34.4	24.5	845.6
1966	37.3	36.5	25.4	928.5
1967	40.8	39.8	24.5	976.4
1968	42.3	41.4	26.7	1,107.0
1969	42.5	41.3	27.4	1,133.1
1970	43.1	42.2	26.7	1,127.1
1971	43.5	42.7	27.5	1,176.1
1972	46.9	45.7	27.8	1,270.6
1973	56.5	55.7	27.8	1,547.5
1974	52.5	51.3	23.7	1,216.3
1975	54.6	53.6	28.9	1,548.3
1976	50.3	49.4	26.1	1,288.6
1977	59.0	57.8	30.6	1,767.3
1978	64.7	63.7	29.4	1,868.8
1979	71.4	70.3	32.1	2,260.7
1980	69.9	67.8	26.5	1,797.5
1981	67.5	66.2	30.1	1,989.1
1982	70.9	69.4	31.5	2,190.3
1983	63.8	62.5	26.2	1,635.8
1984	67.8	66.1	28.1	1,860.9
1985	63.1	61.6	34.1	2,098.5
1986	60.4	58.3	33.3	1,940.1
1987	58.0	57.0	33.7	1,922.8
1988 <u>1/</u>	58.9	57.4	26.8	1,538.7
1989 <u>2/</u>	60.5	59.1	32.3	1,905.0

1/ Preliminary.2/ Forecast.Source: U.S. Department of Agriculture, National Agricultural Statistics Service, Crop Production, annual and monthly issues.

Appendix table 12--Ratios of world soybean exports and ending stocks to world consumption, and U.S. exports to foreign consumption, 1964-89

Crop year <u>1</u> /	World exports to world consumption	World stocks to world consumption	U.S. exports to foreign consumption
	<u>Percent</u>		
1964/65	21.6	5.4	36.2
1965/66	24.0	5.7	43.8
1966/67	23.2	9.5	38.7
1967/68	22.2	15.0	38.5
1968/69	22.8	25.5	38.7
1969/70	28.1	16.3	51.2
1970/71	26.2	7.5	46.1
1971/72	26.4	6.1	41.3
1972/73	31.7	6.0	48.6
1973/74	31.0	10.6	43.3
1974/75	28.5	12.6	34.1
1975/76	30.4	15.6	40.0
1976/77	29.8	9.0	37.8
1977/78	31.1	9.8	43.0
1978/79	31.5	9.6	42.0
1979/80	33.3	15.0	43.6
1980/81	29.1	13.7	36.6
1981/82	33.6	10.7	43.9
1982/83	31.5	13.5	42.4
1983/84	30.5	9.2	35.1
1984/85	27.9	13.8	27.7
1985/86	28.1	19.5	32.6
1986/87	28.0	15.2	30.9
1987/88	29.1	11.9	31.0
1988/89 <u>2</u> /	23.2	8.0	21.3
1989/90 <u>3</u> /	24.7	10.5	21.7

1/ Based on aggregate of differing local marketing years.

2/ Preliminary.

3/ Forecast.

Source: Calculated from data in U.S. Department of Agriculture, Foreign Agricultural Service, Oilseeds and Products Division: production, supply, and distribution database, August 1989.

Appendix table 13--Coefficients of variation for U.S. soybeans 1/

Period	Planted acres	Yield	Production	Exports	Price received	Value of production
1954-58	0.1023	0.0761	0.1896	0.2041	0.0721	0.1256
1959-63	.0869	.0249	.1097	.1355	.0834	.1847
1964-68	.1015	.0515	.1483	.0970	.0433	.1307
1969-73	.1128	.0147	.1255	.0964	.3317	.4708
1974-78	.0913	.0902	.1665	.1908	.1148	.1843
1979-83	.0441	.0925	.1297	.1026	.1419	.0566
1984-88	.1305	.2267	.2199	.3016	.3839	.1756

1/ Coefficient of variation is a measure of variability which equals the standard deviation divided by the mean.

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