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# Cooperative Involvement And Opportunities In Oilseeds

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# Abstract

COOPERATIVE INVOLVEMENT AND OPPORTUNITIES IN OILSEEDS; John R. Dunn, Bruce J. Reynolds, E. Eldon Eversull, Robert A. Skinner, and Stanley K. Thurston, ACS Research Report 13.

This study focuses on the role played by cooperatives in the oilseed complex. The flow of domestically produced oilseeds-soybeans, cottonseed, peanut, and sunflower-seed-from the farm to the final domestic or foreign markets is described for both the cooperative system specifically and the oilseed industries as a whole. Oilseed production, crushing, transportation, marketing, final product manufacturing and selling, and exporting are examined. Industry structures and potential directions for improving cooperatives' role in the oilseeds complex are considered.

Keywords: Cooperatives, oilseeds, soybeans, cottonseed, peanut, sunflower, processing, export, structure, coordination.

# Acknowledgments

Much of the material in this report is based on discussions with representatives of the following organizations: Agri Industries, Agricom, Boone Valley Cooperative Processing Association, Chicago Board of Trade, Continental Grain, Far-Mar-Co, Farmland Industries, Goldkist, Granex Corp., Illinois Cooperative Futures Co., Land O'Lakes, Missouri Farmers Association, National Cottonseed Products Association, National Institute of Oilseed Products, PVO International, Plains Cooperative Oil Mill, Planters Cotton Oil, Ranchers Cotton Oil, Riceland Foods, B.T. Rocca Jr. & Co., Soy Cot Sales, Inc., Unicojapan, Union Oil Mill, and Yazoo-Valley-Minter City Oil Mill. Their contribution is recognized and appreciated. A special note of appreciation is due to Dr. David Cobia, North Dakota State University, for his invaluable contributions to the planning of this project.



# Highlights and Recommendations

Soybeans are the dominant U.S. oilseed crop representing 85.4 percent of total U.S. oilseed production in 1979. Cottonseed accounted for 7.3 percent; sunflowerseed, 4.4 percent; peanuts, 2.4 percent; and flaxseed, 0.5 percent.

The primary soybean producing regions were the Corn Belt with 54.9 percent of total production, Delta States with 15.1 percent, and Lake States with 8.7 percent. Primary cottonseed producing regions were Southern Plains with 38.7 percent of total, Southwest with 32.2 percent, and Delta States with 21.1 percent. Peanut production was centered in the Southeast with 62 percent and Southern Plains with 18.2 percent. Sunflowerseed and flaxseed production was concentrated in the Northern Plains with 69.2 and 77.8 percent and Lake States with 26.6 and 20.4 percent, respectively.

Cooperatives operated 38 oilseed processing plants, 19 of them soybean plants, 17 cottonseed plants, 1 peanut plant, and 1 sunflower/flaxseed plant.

Total cooperative soybean crushing capacity was 280 million bushels in 1979-1980, representing a 20.7 percent share of U.S. crushing capacity and an 8.2 percent share of world crushing capacity. Cooperative soybean crushing capacity increased by 75 percent during the 1970's. Average cooperative plant capacity increased by 37 percent, from 10.7 million bushels per year in 1971 to 14.7 million bushels in 1979. Average plant capacity remained larger for cooperative than for noncooperative plants throughout the 1971-1979 period, though the difference decreased considerably. Total cooperative soybean crush was 232.4 million bushels in 1979 representing a 20.7 percent share of U.S. total, an increase of 72 percent from 1971.

The Corn Belt had the largest share of U.S. total crushing capacity with 54.1 percent, followed by Appalachia with 12.7 percent and Delta States with 11.2 percent. Plants in Appalachia and the Northern Plains had adequate capacity to process all soybeans produced in those regions. The Delta States, Corn Belt, and Lakes States could process only part of their own production, with crush capacities totaling 50, 65, and 33 percent of total production volumes, respectively; the remaining volume was either exported or processed in other regions.

The four largest soybean processing firms in terms of crushing capacity operated 54.5 percent of total U.S. capacity. The top eight firms operated 75.1 percent, and the top 20 firms operated 96.4 percent. Eight of the top 20 soybean processing firms are cooperatives.

Cooperatives operated 17 of the 78 cottonseed mills active in 1979. These mills had a total capacity of 6,690 tons per day for a 35 percent share of total U.S. cottonseed crushing capacity. Cooperative mills averaged 394 tons per day capacity, significantly larger than the 243-ton per day averaged by noncooperative mills.

Cooperative cottonseed crush was 1.6 million tons in 1979, 39 percent of the total U.S. cottonseed crush. Total cooperative crush increased 64 percent between 1977 and 1979, and at the same time cooperatives' share of U.S. crush increased 12 percent.

The four largest cottonseed firms in terms of crushing capacity operated 43.2 percent of total capacity, with 60.6 and 69.6 percent shared by the top 8 and 12 firms, respectively. Six of the top 12 cottonseed processing firms were cooperatives.

Local cooperatives handled about 40 percent of farm soybean sales over the 1970's. Regional cooperatives handled between 19 and 28 percent, the bulk of which moved from local cooperative elevators.

Cooperatives delivered 32 percent of export soybeans to port locations and accounted for between 10 and 15 percent of direct soybean exports. Cooperative deliveries to foreign ports represented about 2 percent of U.S. total. Cooperative share of port elevator storage capacity ranged from a high of 24 percent in the Great Lakes port area to a low 8 percent in the Pacific port area. Cooperative shares of port elevator capacity were 21.1 percent for the Atlantic ports, and 19.5 percent for the Gulf.

This report focuses on the opportunities for U.S. cooperatives to improve their position in the oilseeds complex as they face increasing vertical integration and restructuring by large, competing noncooperative firms. Recommendations presented in this report include the following:

1. The feasibility of establishing cooperative soybean processing plants in the eastern Corn Belt should be examined. These could complement the strong raw soybean programs of regional cooperatives in Illinois, Indiana, and Ohio.
2. The similar technologies of processing plants points to the potential for commonly held parts inventory for processing cooperatives. Feasibility of a multicooperative parts inventory to supplement individual plant inventories should be examined.
3. Expanded refining capacity is the next logical step in increasing the cooperative role in the domestic oilseeds complex. To attain this, more refining capacity is needed by cooperative plants, particularly in the western Corn Belt. Feasibility and implementation plans for expanding refining capacity by cooperatives in this area should be examined.
4. Cooperatives producing oilseed products for consumer use should consider uniting with other consumer product cooperatives to establish a cooperative quality assurance association. This association would develop and promote a generic cooperative symbol to be displayed on consumer products produced by cooperatives.
5. Cooperatives marketing raw oilseeds and oilseed products should consider consolidating their export efforts. This unified effort would eliminate duplication of organization and capital investment and would help cooperatives expand their role in the world oilseeds complex. Such an effort would require more coordination between cooperative export and domestic marketing activities. Firm commitments to deliver to the export organization would be required if cooperatives were to maintain individual domestic marketing programs.



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# Cooperative Involvement and Opportunities in Oilseeds

by John R. Dunn, Bruce J. Reynolds, E. Eldon Eversull,  
Robert A. Skinner, and Stanley K. Thurston

The U.S. oilseeds complex is a set of horizontally and vertically related industries encompassing a wide variety of activities, but tied by a common foundation, oil-bearing farm commodities. The importance of the oilseeds complex to the U.S. farm and domestic economy has grown considerably over the past two decades.

Oilseed commodities represented 10.4 percent of total farm cash receipts in 1980. Over half a million farms grow soybeans, more than for any other cash commodity except corn.

Oilseed commodity and product exports were worth \$8.9 billion in 1979, representing 25.6 percent of total U.S. agricultural exports. World export trade of oilseed commodities and products contributed a significant \$7.9 billion to the U.S. balance of payments.

The moving force in the U.S. oilseeds complex is the domestic and world demand for edible fats and oils, and protein. Food related demand is supplemented by a much smaller, though significant industrial demand for oils and resins. Demand for oilseeds and oilseed products at every vertical level in the oilseeds complex is derived from final retail demand for oilseed products. These products cover many uses including margarine, salad oil, shortening, animal feed, meat substitutes, infant formula, candies, medicines, paints, and soaps.

Domestically produced oilseeds include soybeans, cottonseed, sunflowerseed, flaxseed, and peanuts. These commodities must compete among themselves and to varying degrees, with other sources of fats and protein. Substitute fat and protein sources include both vegetable and animal fats such as palm, copra, lard, coconut, and fish oil and meal. Many substitutes are produced throughout the world, reflecting the global nature of markets for fats, oils, and proteins.

Farm level market characteristics for domestic oilseeds vary considerably. Soybeans and sunflowerseed are produced in response to market prices determined in an effectively competitive market. Cottonseed is a direct byproduct of cotton production which is produced in response to domestic and world demand for fibers. Peanut production has historically been highly regulated with federal programs controlling both price and production.

Several steps are involved in transforming raw farm commodities to finished retail products. Oilseeds must first be assembled at country points and transported either to export markets as raw commodities or to domestic processing facilities where oil and meal are produced. Cotton must be assembled at gins and the seed removed and shipped to the processing plant. Meal is then either exported, shipped to feed mills or farms for blending into feed, or processed further into concentrated protein forms and food substitutes.

Resins must first be removed from the crude oil in a degumming process. The byproduct of degumming may then be sold for industrial and cosmetic uses and as an emulsifier in processed foods. Degummed oil may be further refined to remove undesirable taste characteristics and to alter its physical stability properties. At this point oil may be manufactured into either consumer or industrial products. Degummed or further refined oil may also be sold in export markets.

U.S. cooperatives play a significant role in many levels of the oilseeds complex. This report focuses on that role and its expansion. Cooperative activities in processing, refining, product manufacturing, marketing, distribution, and export are discussed. The two oilseeds with the largest volumes—soybeans and cottonseed—are emphasized.

## Oilseed Crop Production

U.S. oilseeds—soybeans, cottonseed, peanuts, flaxseed, and sunflowerseed—have become a major crop grouping over the past 20 years. Gross farm receipts from oilseed sales surpassed those from the four major feed grains in 1977 (\$11.8 compared to \$9.8 billion) and in each subsequent year.

**Table 1 —Regional Shares of U.S. Soybean Production; Averages for 1959-69, 1970-79, 1976-79**

Region <sup>1</sup>	Period		
	1959-69	1970-79	1976-79
	Percent		
Appalachia	6	8	8
Lake States	9	8	9
Cornbelt	60	57	55
Southeast	3	6	6
Delta States	15	15	15
Northern Plains	5	4	6

<sup>1</sup>One percent or less in regions not identified.

**Table 2 —Regional Shares of U.S. Cottonseed Production; averages for 1959-69, 1970-79, 1976-79**

Region <sup>1</sup>	Period		
	1959-69	1970-79	1976-79
	Percent		
Appalachia	6	4	2
Cornbelt	3	2	2
Southeast	11	7	4
Delta States	26	25	21
Southern Plains	34	34	39
Southwest	20	28	32

<sup>1</sup>One percent or less in regions not identified.

**Table 3 —Regional Shares of U.S. Peanut Production; averages for 1959-69, 1970-79, 1976-79**

Region <sup>1</sup>	Period		
	1959-69	1970-79	1976-79
	Percent		
Appalachia	27	20	19
Southeast	51	61	62
Southern Plains	22	19	19

<sup>1</sup>One percent or less in regions not identified.

Soybeans have dominated the increasing oilseed production over the last 21 years (figure 1).

The United States is divided into 11 regions for the first sections of this report (figure 2). Oilseeds are grown in all but 12 States. Soybeans are raised in 30 States and cotton is raised in 18 States. Peanuts are grown in 10 States. Flaxseed and sunflowerseed are grown in four States.

## Soybeans

At the beginning of the 21-year period from 1959 to 1979, government programs were largely responsible for promoting the popularity of soybeans. Acreage controls were set on cotton, peanuts, corn, and wheat, but not on soybeans. Soybeans proved to be an excellent replacement for those crops. In the early 1970's, increased export demand for soybeans absorbed supplies in excess of domestic requirements.

Soybean production has increased over 300 percent in the last two decades (appendix table 1), with the largest growth in the South. The Corn Belt produces over half of the U.S. soybean crop (table 1). The next largest producers are the Delta States and Lake States with 15 and 8 percent shares, respectively.

## Cottonseed

Cottonseed was the major U.S. oilseed before synthetic fibers became popular. Cottonseed is a direct byproduct of cotton production, increasing only as the supply of cotton expands. Rising energy prices have caused synthetic fibers to cost more relative to cotton fibers. However, higher energy costs push up the expense of producing cotton as well, so the ultimate impact on cotton remains unclear.

Cottonseed production has fallen to 96.7 percent of its level two decades ago (appendix table 2). The Southern Plains produces the most cottonseed with a 38.6 percent share of U.S. total production over the 1959 to 1979 period (table 2). The Southwest and Delta States rank second and third in production with 32 and 21 percent shares, respectively. The Southwest and Southern plains have increased their shares of total production over the past two decades, while all other regions have had decreasing shares.

Cotton is well adapted to dryland growing conditions in the Southern Plains and California. The movement of cotton production to the Southwest and Southern Plains was prompted in part by insect infestation which caused great damage in the Delta States and Southeast. Cottonseed is grown almost entirely under irrigation in the Southwest, an increasingly expensive method of crop production. Water shortages and further restrictions on water usage rights may limit cottonseed production in this region.



Figure 1

**Oilseed Production by Commodity for Selected Years**

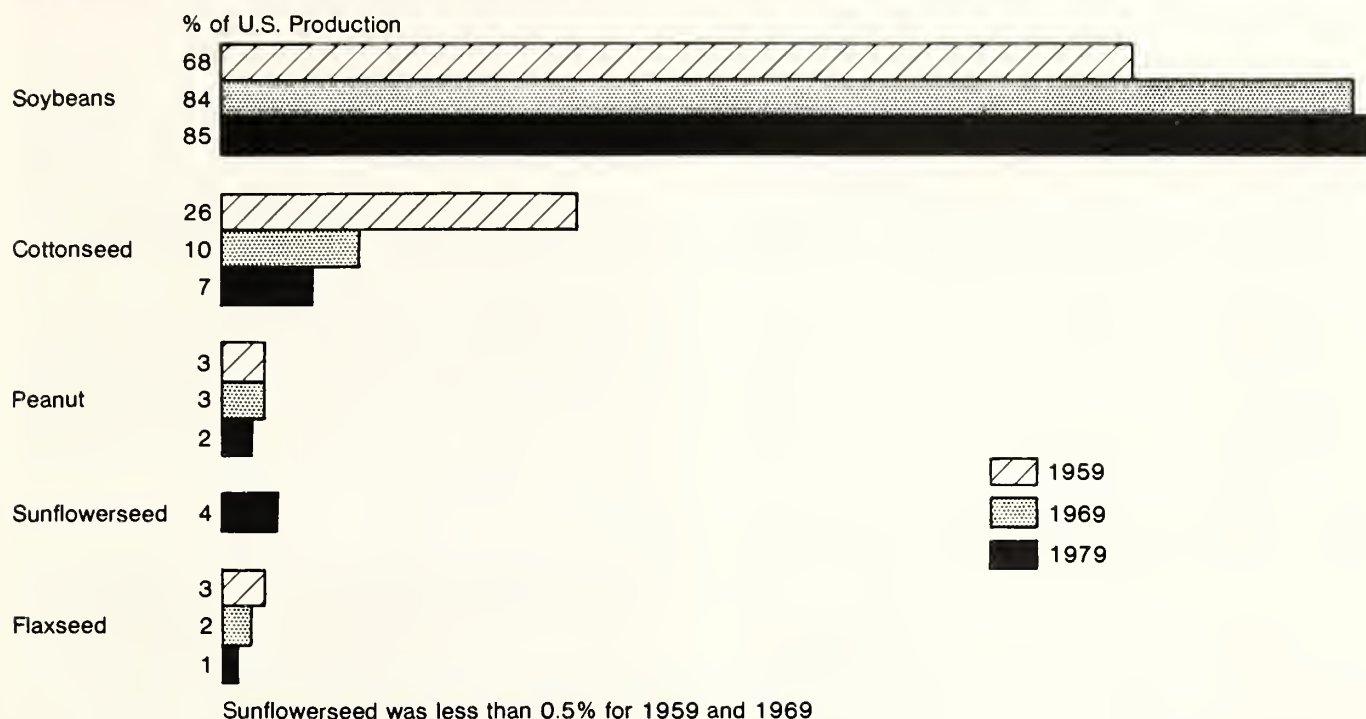
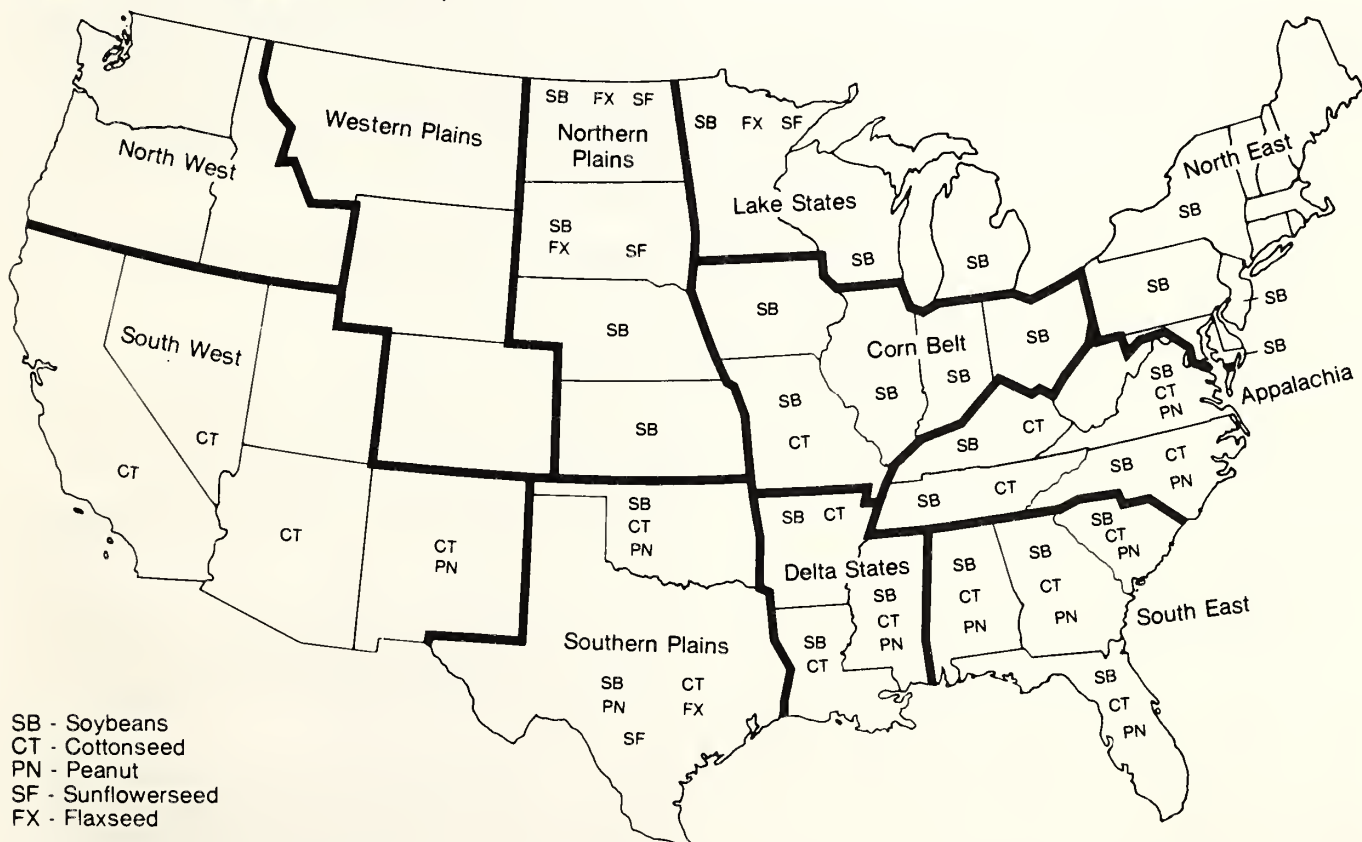


Figure 2

**Oilseed Production Areas, 1979**



**Table 4 —Regional Shares of U.S. Flaxseed Production; averages for 1959-69, 1970-79, 1976-79**

Region <sup>1</sup>	Period		
	1959-69	1970-79	1976-79
	Percent		
Lake States	20	18	20
Northern Plains	74	79	78
Southern Plains	3	2	2
Southwest	2	(s7 <sup>2</sup> )	(2)

<sup>1</sup>One percent or less in regions not identified.

<sup>2</sup>Less than 1 percent.

**Table 5 —Regional Shares of U.S. Sunflowerseed Production; averages for 1970-79, 1976-79**

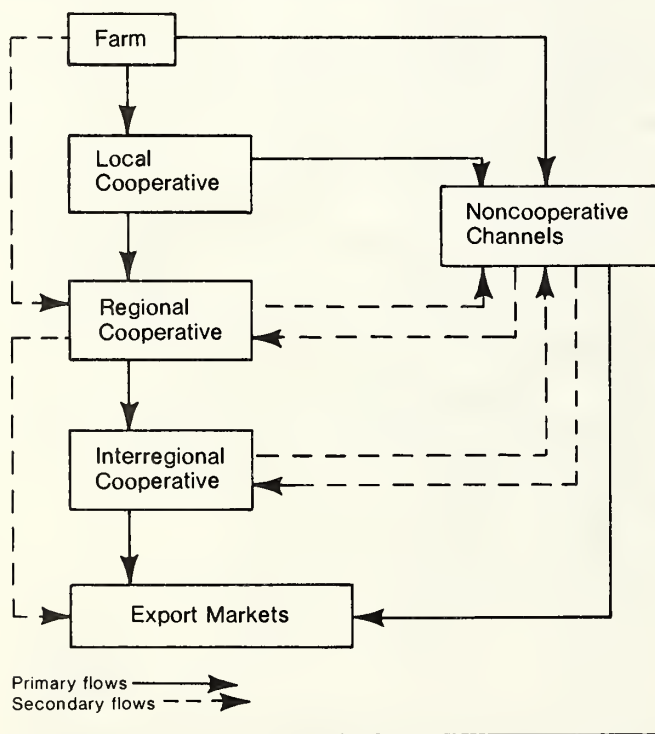
Region <sup>1</sup>	Period <sup>2</sup>	
	1970-79	1976-79
	Percent	
Lake States	27	27
Northern Plains	71	69
Southern Plains	2	4

<sup>1</sup>One percent or less in regions not identified.

<sup>2</sup>Accurate data not available for 1959-69 period.

**Figure 3**

#### Cooperative Export Marketing Channels for Raw Oilseeds



## Peanuts

The peanut is one of the few crops that is still grown under acreage allotments. Under the 1980 program, the farmer produces his poundage quota, and the peanuts that meet the quality standard receive the price support. All other peanuts, even of equal quality, are additional peanuts and not under price support. Peanut production has increased 161 percent from 1959 to 1979 (appendix table 3). The major production region is the Southeast with a share of over 60 percent (table 3). The Appalachia and Southern Plains are second and third with 18.8 and 18.2 percent shares, respectively.

## Flaxseed

Flaxseed was once a more major oilseed and was used extensively as a drying oil in paints before latex paints were developed. Flaxseed production has declined to only 63.7 percent of the level of 21 years ago (appendix table 4). The Northern Plains produces 77.8 percent of U.S. flaxseed (table 4), and the Lake States, 20.4 percent.

## Sunflowerseed

Oil-bearing sunflowerseed has experienced the largest growth of all U.S. oilseeds. Production increased 1,670 percent between 1974 and 1979 (appendix table 5). Sunflower is well adapted to a shorter growing season and a drier climate, and has replaced flax in several regions. The Northern Plains produces the most with 69.3 percent, and the Lake States region produces 26.6 percent (table 5). Oil-bearing sunflowerseed varieties were not grown commercially in the U.S. until 1966.

## Overview of Cooperative Oilseed System

### Cooperative Oilseed Flows

The cooperative role in the oilseeds complex may be described by two distinct, but interrelated flows. The first flow involves the exporting of raw commodities with no change in their form. The second flow involves domestic processing of raw commodities and moving them to retail markets, both domestic and foreign, with the physical characteristics of the commodity changing at every step.

The flow of raw oilseed commodities through cooperative channels from the farm to the export markets is diagrammed in figure 3. A somewhat subjective distinction is made between primary flows (solid lines) and secondary flows (dashed lines).

Oilseed crops are delivered to local elevators by truck or by tractor and wagons. Local cooperative elevators assemble quantities of the commodity and deliver to subterminal or terminal elevators. There, regional cooperatives assemble

larger quantities of the commodity at terminal elevators and move them to export facilities on the coasts or the Great Lakes. From these facilities, owned by regional or interregional cooperatives, export sales are made under various arrangements.

In some cases, a step in the cooperative organizational chain may be bypassed. Farmers may deliver directly to regional owned subterminal or terminal elevators, bypassing local cooperative elevators. Regional cooperatives may bypass interregionals and complete their own export sales.

At every level in the farm-to-export chain there is significant leakage from the cooperative oilseed system into noncooperative channels. Some quantities also flow the other way, but to a lesser degree. Two factors create this fluidity: (1) the price competitive nature of most oilseed commodity markets, and (2) the voluntary relationship in marketing between cooperative associations.

Figure 4 shows the processed product flow of oilseed products from the farm to the retail markets through the cooperative system. The processed product flow begins the same way as the export flow, from farm to local to regional cooperative facilities, with inflow and outflow to noncooperative channels.

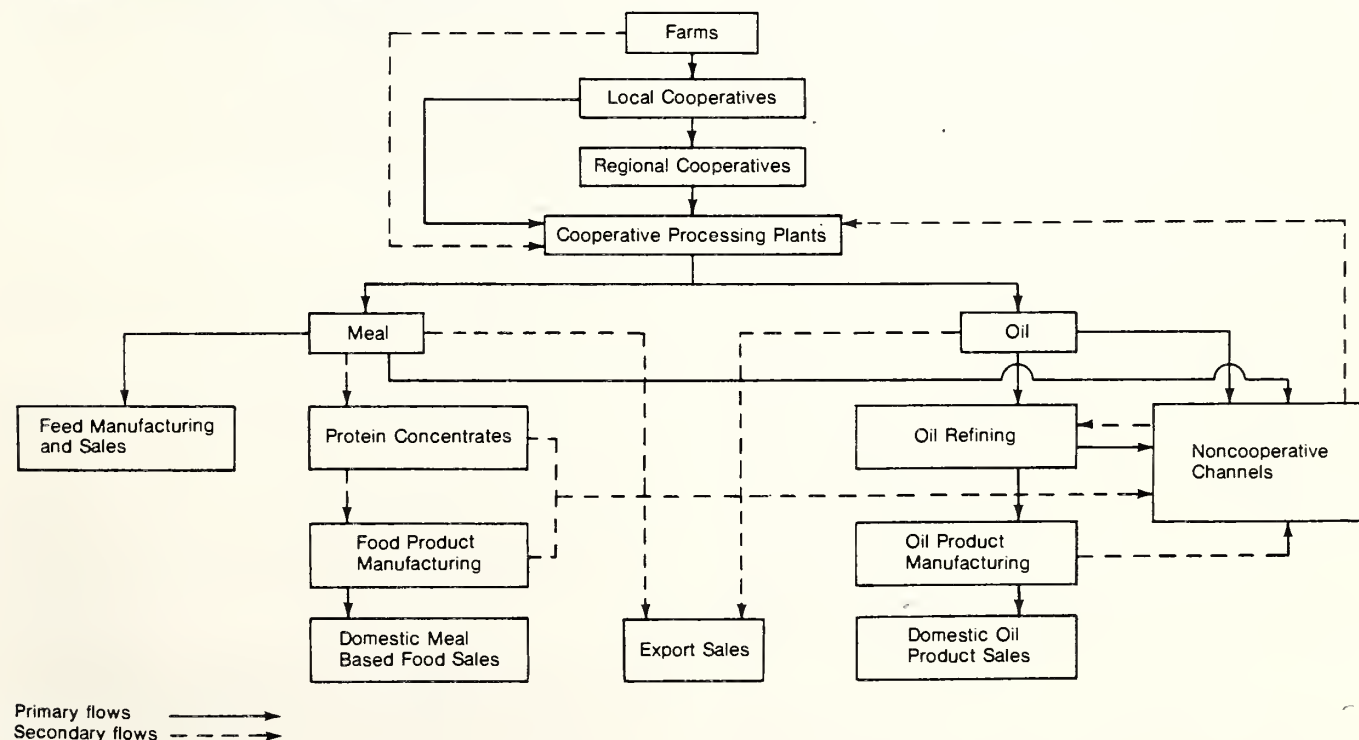
From the assembly stage, raw oilseeds move to cooperative processing plants, generally operated by regional cooperatives. After processing, oilseed meal and oil follow separate paths. Crude oil is degummed, refined, and manufactured into final product form. Oil products may then be brand-name labeled and sold to wholesale or retail distributors or private labeled for noncooperative wholesalers and retailers. Cooperatives export a limited quantity of degummed oil.

Most meal processed by cooperatives moves into cooperative feed manufacturing plants or to noncooperative channels, with a small portion exported. Some meal goes into various protein concentrates used in producing a variety of human foods. Cooperatives producing protein concentrates usually sell these products to food processors, but may sell under a cooperative brand name or a private label.

The dual flow segmentation is of greater relevance for some oilseed commodities than others. For soybeans, both flows are significant, as are both the meal and oil segments. For cottonseed, the processed product flow dominates. Very little unprocessed cottonseed is exported. Sunflowerseed is of importance in both the export and domestic markets; however the meal side of the domestic product flow is of minor importance. Both flows are appropriate for peanuts, but two

Figure 4

#### Cooperative Channels for Oilseed Products





major factors greatly modify the flows: government farm programs, and the fact that the primary demand for peanuts is for its whole peanut form.

### Cooperative Organizational Approaches

Cooperatives may organize and operate their oilseed activities in a number of ways, both individually and as a group. These options involve decisions along two basic dimensions; vertical integration and intercooperative or horizontal coordination. The decision field for cooperatives is described through figure 5, which indicates the extent of vertical intergration along the vertical axis and intercooperative coordination along the horizontal axis. When considered at a single vertical level, intercooperative coordination is tantamount to horizontal coordination.

Each of the four corners of the diagram, labeled A, B, C, and D, represent a pure organizational form for cooperatives.

At point A, a cooperative is involved in a single vertical level of activity, such as assembly, and operates completely independent of any other cooperative organizations. At point

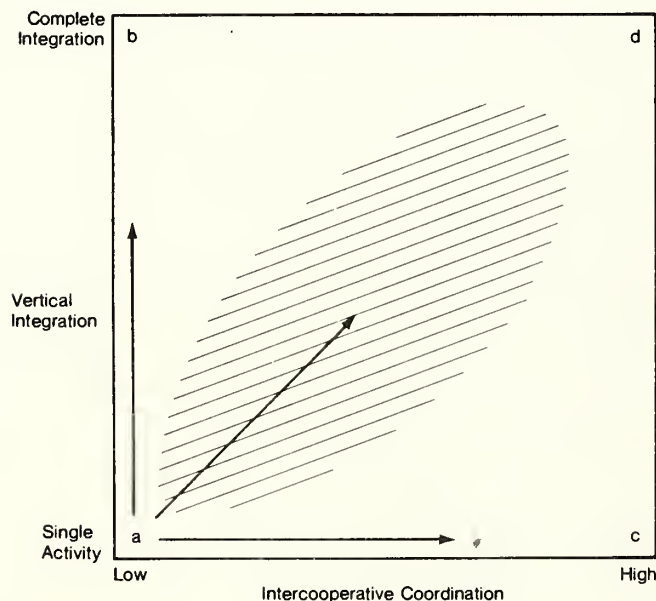
B, a cooperative is vertically integrated to the fullest extent. Vertical control and coordination are carried out completely within the cooperative organization. At point C, horizontal coordination at a single activity level is complete. All cooperative involvement at that activity level is carried out by a single federated or centralized organization. Examples of point C cooperative organizations might be a cooperative bargaining agency or a federated sales agency. At point D, all vertical and horizontal involvement is controlled by a single cooperative organization.

Points within this diagram represent the innumerable combinations of vertical and horizontal organization and involvement. Cooperatives operating within the oilseeds complex may be found over much of the area in the box diagram; however, most cooperatives' operations probably fall within the oval area.

The arrows in the diagram distinguish the three basic paths that cooperatives in the oilseeds complex may follow to achieve growth, higher returns to producers, and greater stability of producers' incomes. These basic paths are vertical integration by individual cooperatives, horizontal coordination by groups of cooperatives, and vertical coordination by groups of cooperatives.

Figure 5

### Cooperative Coordination Paths



### Vertical Integration by Individual Cooperatives

A cooperative may decide to integrate vertically, either forward or backward, for a number of reasons. The cooperative may want to capture value added, to establish more secure markets and/or sources of supply, to eliminate inefficient pricing points, to bypass monopolized or concentrated markets, or to more efficiently transport commodities and products between vertical levels in the oilseed complex.

A cooperative's ability to vertically integrate depends on two factors: The ability and willingness of its members to provide the capital necessary to enter adjacent vertical levels at a cost effective scale, and the ability of cooperative management to perform successfully at the new level.

Vertical integration brings a cooperative acting independently a number of advantages including (1) more responsive centralized control across pricing points, (2) higher potential returns, (3) development of a system that can be tailored to fit the needs of its own members, and (4) better top-to-bottom communication between members and management, enhancing member loyalty and support.

The disadvantages of the independent approach include the higher capital commitment, increased exposure to risk, a more limited volume, duplication of cooperative facilities, inter-cooperative competition, loss of clarity of pricing signals, and possible regional myopia.

## Horizontal Coordination by Groups of Cooperatives

A group of cooperatives involved in the same vertical level may choose to combine volumes to strengthen their collective market position. Such a horizontal combination may take several forms ranging from full merger to a federated sales agency, to an exclusive bargaining agency.

A horizontal combination strategy increases market power. In dealing from a position of strength, cooperatives can ensure that their members receive maximum value for their production.

A successful horizontal combination strategy requires control of incoming commodity volume—and this is a major difficulty. Without such control, fluctuating volumes combined with members' high expectations can greatly weaken the marketing strategy. The organization would be expected to obtain high price even in the face of over-production and surplus. The alternative—strict production or volume controls—would create problems by forcing producers or organizations to give up their production and marketing decisionmaking prerogatives.

## Vertical Coordination by Groups of Cooperatives

A group of cooperatives may extend their individual operations vertically by creating a jointly owned and operated organization. Such an action may be taken to facilitate cooperative entry into a particular activity or to bring existing cooperative presence up to a more efficient size. Multi-cooperative vertical thrusts in the oilseeds complex might take a simple single activity form, such as a cooperative quality assurance laboratory, or a complex form, such as a refining, product manufacturing, and sales organization.

A combined cooperative vertical effort pools risk, eliminates duplication, creates a greater ability to accumulate capital, allows market entry at a more efficient size, facilitates a more orderly flow of products, and makes higher returns possible. This vertical extension by a group of cooperatives also increases horizontal coordination at preceding stages by lowering dependence on noncooperative firms for all sales at these levels.

The ultimate extension of a combined cooperative vertical effort is a fully integrated cooperative entity. Origination, transportation, manufacturing, and sales would be completely internal, maximizing cooperative control of the farm-to-consumer flow.

Top to bottom control would enable the fully integrated, national cooperative to make investment and operational decisions that would assure the most orderly and efficient movement of oilseed products to their final markets. Value

added would be captured at each successive vertical level, raising final returns to producer-owners.

The disadvantages of combined cooperative vertical efforts are embedded in two problems: communications loss and the divergence of interests among groups of producers.

As a cooperative's operations become more vertically removed from the operations of its producer-owners, maintaining member involvement and commitment becomes increasingly difficult. Cooperative management and producer-owners necessarily communicate less because of the constraints of time and distance. As the cooperative enters more advanced marketing stages, member involvement must be increasingly emphasized to prevent erosion of its membership base.

Commodity, agronomic, geographic, climatic, and social-cultural differences throughout the country harbor great potential for divergence of interests. The dynamic problems thus created are never completely eliminated, just changed in intensity and form over time.

The joint return maximization efforts of a national combination of oilseed cooperatives would not necessarily maximize short-run returns for each of the involved regions or commodities. Members from one region might believe they could consistently obtain more satisfactory results. One commodity group might believe they did not receive equitable treatment. Interregional and intercommodity problems would then be created to damage the national's effectiveness. Participants must take a long-range outlook to ensure continued success of the national organization.

## Oilseed Crushing

The vast majority of total U.S. oilseed crush is soybeans, representing 86 percent of total by weight, up from a 65 percent share in 1959 (figure 6). Cottonseed and flaxseed have smaller and decreasing shares of total U.S. oilseed crush.

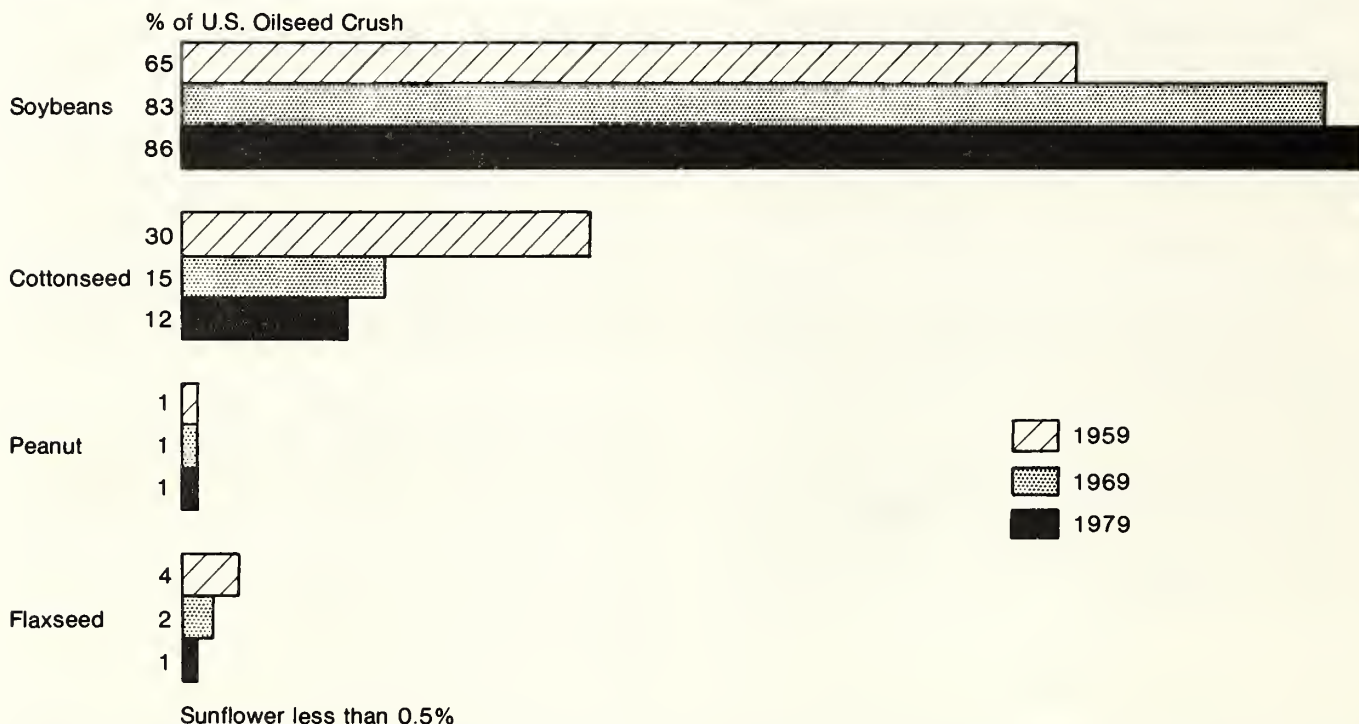
U.S.-produced oilseeds are crushed at significantly different rates (figure 7). Less than half (49 percent) of the 1979 U.S. soybean crop was crushed domestically, down from 74 percent in 1959. Cottonseed crush as a proportion of total production was considerably higher at 77 percent, down, however, from crush in excess of 90 percent in 1959 and 1969. Flaxseed is crushed almost entirely domestically, 100 percent in 1959, and 96 percent in 1979. Special carryover circumstances led to a low crush in 1969. Crush figures for peanut reflect the secondary nature of its use for oil. Sunflowerseed is crushed primarily in foreign locations, with only 24 percent in 1974 and 17 percent in 1979 crushed domestically.

Cooperatives operate plants that crush soybeans, cottonseed, sunflowerseed, flaxseed, and peanut. Figure 8 shows the locations of these 38 plants.



Figure 6

**Oilseed Crush Shares by Commodity for Selected Years**



**Soybeans**

In 1979, 86.5 percent of U.S. oilseed crushing capacity was for soybeans. Cooperatives operated 19 soybean processing plants for crop year 1979. Sixteen of these plants were solvent extraction and the remaining three were screw press plants.

The 19 soybean processing plants were owned by 11 cooperative associations. Three cooperatives—Goldkist, Farm-land Industries, and Land O'Lakes—operated three plants. Two cooperatives, Agri Industries and Riceland Foods, operated two plants. Within this group of multiple-plant cooperatives were two associations that operated plants to crush other domestic oilseeds: Goldkist—peanuts, and GTA Honeymead—sunflowerseed and flaxseed.

Cooperative share of soybean crushing capacity showed an upward trend during the 1970's (table 6) with cooperatives gaining 1.5 to 2.5 percent over the decade.

Total crushing capacity for the 19 cooperative soybean plants was 280 million bushels in 1979. This represented a 20.7 percent share of total U.S. crushing capacity and an 8.2 percent share of global crushing capacity. Capacity for the 16 solvent extraction plants was 278.1 million bushels.

Since 1971, cooperative soybean crushing capacity has increased 75 percent. This compares to a 45 percent increase in noncooperative capacity and a 50 percent increase industry-wide. The increase in cooperative crushing capacity is due primarily to acquisition of new plants, though capacities increased at several cooperative plants.

The number of soybean crushing plants has decreased from 123 in 1971 to 94 in 1979 (table 7). During that period, the decrease in plant numbers was completely within the non-cooperative group, as cooperatives grew from 15 to 19 plants. The decrease in plant numbers industrywide resulted largely from the closing of small, inefficient screw or hydraulic press plants.

The average annual crushing capacity of U.S. soybean plants grew from 7.3 million bushels in 1971 to 14.4 million bushels in 1979, an increase of almost 96 percent. Over that period, average cooperative capacity grew 37 percent, from 10.7 million to 14.7 million bushels. Average capacity for cooperative solvent extraction plants increased 19 percent, from 13.2 million to 15.7 million bushels. Noncooperative plants increased in size by 110 percent, from 6.8 to 14.3 million bushels with approximately 42 percent of the increase due to the closing of older and smaller plants.

Figure 7

## Oilseed Production Percentage Crushed Domestically by Commodity for Selected Years

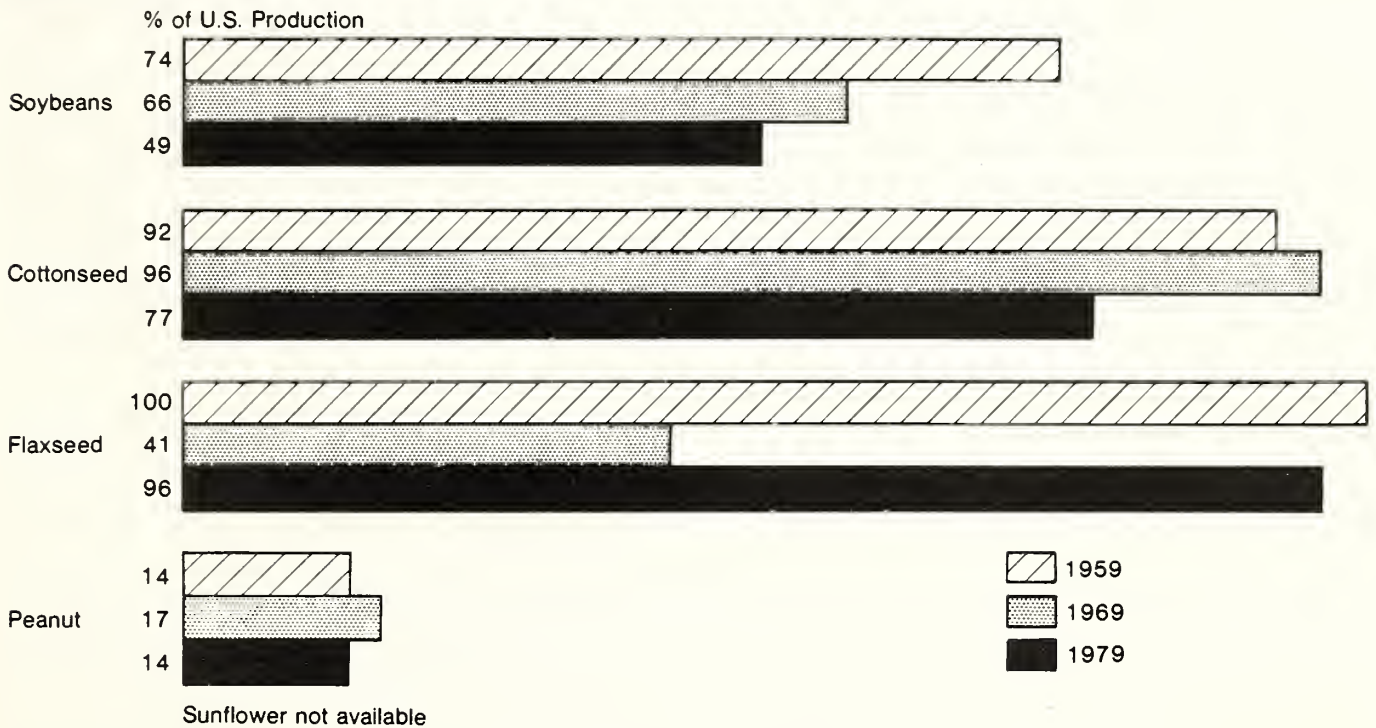


Table 6—Soybean crushing capacity; total cooperative and noncooperative. Cooperative share of crushing capacity, 1971-1979 crop years

Marketing year	U.S. annual crushing capacity	Cooperative annual crushing capacity	Noncooperative annual crushing capacity	Cooperative share of U.S. total crushing capacity
		Million bushels	Percent	
1971	900	160.2	739.8	17.8
1972	925	178.5	746.5	19.3
1973	1,000	178.5	821.5	17.8
1974	1,050	176.7	873.3	16.8
1975	1,100	235.7	864.3	21.4
1976	1,200	242.2	957.8	20.2
1977	1,250	260.5	989.5	20.8
1978	1,300	262.0	1,038.0	20.2
1979	1,350	280.0	1,070.0	20.7

Sources: U.S. Department of Agriculture, *U.S. Fats and Oils Statistics, 1963-1978*, Statistical Bulletin No. 631, Economics, Statistics and Cooperative Service. U.S. Department of Agriculture, *Operational Data on Soybean Processing Cooperatives, 1971/72 through 1979/80*, Agricultural Cooperative Service.

Table 7—Number of soybean crushing mills; U.S. total, co-op and nonco-op. Average mill capacity; U.S., co-op and nonco-op, 1971-1979 crop years

Marketing year	Soybean crushing mills			Average annual crushing capacity		
	U.S. total <sup>1</sup>	Co-op <sup>2</sup>	Nonco-op	U.S. total	Co-op	Nonco-op
		Number		Million bushels		
1971	123	15	108	7.3	10.7	6.8
1972	117	15	102	7.9	11.9	7.3
1973	113	15	98	8.8	11.9	8.4
1974	108	15	93	9.7	11.8	9.4
1975	103	17	86	10.7	13.9	10.1
1976	103	17	86	11.6	14.2	11.1
1977	99	18	81	12.6	14.5	12.2
1978	95	18	76	13.8	14.6	13.5
1979	94	19	75	14.4	14.7	14.3

<sup>1</sup> U.S. Department of Agriculture, *Fats and Oils Situation*, October 1980, FOS-297. Economics, Statistics, and Cooperative Service.

<sup>2</sup> U.S. Department of Agriculture *Operational Data on Soybean Processing Cooperatives 1971/72 through 1979/80*. Agricultural Cooperative Service.

Figure 8

## Cooperative Oilseed Processing Plants, 1979



Table 8—Soybeans crushed, U.S. total, cooperative crush, nonco-op crush, cooperative share of total crush, 1971-1979 crop years

Crop year	Total U.S. crush	Total cooperative crush	Total nonco-op crush	Cooperative share of total U.S. crush
	Million bushels			Percent
1971	720	135.3	584.7	18.8
1972	722	134.2	587.8	18.6
1973	821	137.4	683.6	16.7
1974	701	123.1	577.9	17.6
1975	865	173.1	691.9	20.0
1976	790	174.7	615.3	22.1
1977	927	203.7	723.3	22.0
1978	1,018	217.5	800.5	21.4
1979	1,123	232.4	890.6	20.7

Table 9—Utilization of soybean crushing capacity: U.S. overall average, cooperative average, noncooperative average, 1971-1979 crop years

Marketing year	Average U.S. capacity utilization	Average cooperative capacity utilization	Average noncooperative capacity utilization
	Percent		
1971	80.0	84.5	79.0
1972	78.1	75.2	78.7
1973	82.1	77.0	83.2
1974	66.8	69.7	66.2
1975	78.6	73.4	80.1
1976	65.8	72.1	64.2
1977	74.2	78.2	73.1
1978	78.3	83.0	77.1
1979	83.2	83.2	83.2

Source: U.S. Department of Agriculture *Fats and Oils Situation*, FOS-301, October 1980, Economics and Statistics Service.

Operational Data on Soybean Processing Cooperatives, Unnumbered, Agricultural Cooperative Service.



Cooperatives crushed an estimated 232.4 million bushels of soybeans in 1979 (table 8), up 16 percent from the 107.6 million bushels crushed in 1969. This compares to the 41 percent increase in crush by noncooperative plants, from 629.4 million bushels in 1969 to 890.6 million bushels in 1979.

Cooperative share of the total U.S. soybean crush has increased steadily from 14.5 percent in 1969 to a stable 20 to 22 percent during the 1975-1979 period.

Utilization of capacity (table 9) for all plants has ranged over the 1971-1979 period from a low of 65.8 percent in 1976 to a high of 83.2 percent in 1979. Cooperative plants varied in rates of capacity utilization over that period from a low of 69.7 percent in 1974 to a high of 84.5 percent in 1971.

On a regional basis, cooperative presence in soybean crushing varies widely. Cooperatives control only 15.6 percent of crushing capacity in the combined Corn Belt and Lake States regions. They control 35.4 percent of the capacity in the combined Southeast and Delta States regions (table 10).

Cooperative share of crushing capacity also varies greatly within regions. For example, in the Corn Belt, cooperatives have no crushing capacity in Illinois, Indiana, and Ohio, but have an estimated 47.2 percent share in Iowa and Missouri.

Average cooperative plant size differs significantly from region to region. Cooperative plants average 1,090 tons per day in the combined Corn Belt and Lake States regions, and 1,520 tons per day in the Southeast and Delta States.

Regional soybean crushing capacity is related to regional soybean production in table 11 for 1979 crop year capacities. Crushing capacity in both Appalachia and Northern Plains exceeds soybean production. Crushing capacities in the Lake States, Delta States, and Corn Belt regions are considerably lower than production. Soybeans produced in these regions must be shipped elsewhere for processing or to export. The proportion of regional soybean production processed within each region reflects, in part, the regional markets for soybean meal. It also points out areas for possible expansion of soybean processing capacity.

The structure of the soybean crushing industry for 1979 is detailed in table 12. Total number of plants, average number of plants, total capacity, average plant capacity, and share of industry capacity is shown cumulatively and for four firm groups for the top 4, 8, 12, 16, and 20 firms in the soybean crushing industry. Firms are ranked based on crushing capacity. Table 12 includes only those plants classified as soybean mills, so the data do not reflect the possibility of crushing other oilseeds in those plants or of crushing soybeans in plants classified as cottonseed or other oilseed plants.

**Table 10—Soybean crushing capacity shares and cooperative shares of crushing capacity, by region, 1979**

Region	Region share of total U.S. crush capacity	Cooperative share of region capacity
	<i>Percent</i>	
Southeast	8.3	[35.4 <sup>1</sup> ]
Delta States	11.2	
Appalachia	12.7	0
Lake States	4.4	[15.6 <sup>2</sup> ]
Corn Belt	54.1	
Southern Plains	1.1	0
Northern Plains	7.3	0

<sup>1</sup> Combined capacity for Southeast and Delta States.

<sup>2</sup> Combined capacity for Lake States and Corn Belt.

**Table 11—Soybean crushing capacity and proportion of soybean production<sup>1</sup> which may be crushed within each region, 1979**

Region	Region annual crushing capacity	Proportion of regional production which may be crushed with region
	<i>Million bushels</i>	<i>Percent</i>
Southeast	111.5	87
Delta States	154.2	50
Appalachia	171.7	105
Lake States	59.6	33
Corn Belt	730.4	65
Southern Plains	14.9	84
Northern Plains	98.7	104

<sup>1</sup> Average production in years 1976-1979.

The largest four firms own 37 plants or almost 40 percent of the soybean plants in the United States. The top eight firms own 55 plants or 58.5 percent of all plants.

The average number of plants owned by firms in the top four is 9.25, more than twice as many as the 4.5 figure for plants in the second largest four firm group. Average number of plants tapers off rapidly down the firm rankings. Firms in the top 12 groups, with one exception, are multiplant firms. Firms ranked 13 through 20 are largely single plant firms, with only two firms owning two plants. Noncooperative firms operating more than one U.S. plant include A. E. Staley, Anderson Clayton, Archer Daniels Midland, Bunge, Cargill, Central Soya, and Ralston Purina.

Average plant size relates somewhat to firm rank. Firms in the top four group own plants averaging 1,647 tons per day capacity. Firms ranked 13 through 16 are next highest in average plant size at 1,460 tons per day. Average plant size drops off significantly past the top 16 firms. Only two firms in the top 16 and four firms in the top 20 average less than

**Table 12—Structural characteristics of the domestic soybean processing industry in terms of plant numbers and capacities, 1979**

Firm grouping	Total plants	Average number of plants	Total capacity	Average plant size	Share of capacity
	Number		Tons per day		Percent
Top 4 firms	37	9.25	60,950	1,647	54.5
Firms 5-8	18	4.50	23,100	1,283	20.6
Top 8 firms	55	6.87	84,050	1,528	75.1
Firms 9-12	9	2.25	12,545	1,394	11.2
Top 12 firms	64	5.33	96,595	1,509	86.3
Firms 13-16	5	1.25	7,300	1,460	6.5
Top 16 firms	69	4.31	103,895	1,506	92.8
Firms 17-20	5	1.25	4,000	800	3.6
Top 20 firms	74	3.70	107,895	1,458	96.4

1,000 tons per day capacity. Three of these four firms averaged over 900 tons per day.

The top four firms control a total capacity of 60,950 tons per day, or 54.5 percent of the U.S. total 111,950. The next four firms own 23,100 tons per day capacity, 20.6 percent of the U.S. total. The eight-firm share is 75.1 percent. Four-firm group shares continue to decrease, down to the 4,000 tons per day capacity or 3.6 percent of U.S. total for the 17 through 20 ranked firms. The top 20 firms hold 96.4 percent of the U.S. total capacity.

Cooperatives are well represented in the top 20 soybean processing firms. While none are in the top four, two cooperatives—Goldkist and Farmland Industries—are within the top eight. Two more cooperatives—Riceland Foods and Land O'Lakes—are within the top 12 firms. Firms 14 through 17 are all cooperatives—Honeymead Products, Inc., Agri Industries, Boone Valley Co-op Processing Association, and Missouri Farmers Association. Thus 8 of the top 20 domestic soybean processing firms are cooperatives.

## Cottonseed

Cottonseed was the number two oilseed crushed, representing 11.8 percent of total U.S. crushing capacity. Cooperatives owned and operated 17 of the 78 active cottonseed mills in

1979-80. Cottonseed mills are distributed throughout the southern tier of the United States including the Appalachia, Southeast, Delta States, Corn Belt, Southern Plains, and Southwest regions. Most cooperative cottonseed mills are in the Delta States, Southern Plains, and Southwest.

Regional characteristics of the cottonseed crushing industry are detailed in table 13. The total U.S. daily crushing capacity was 18,925 tons in 1980. Cooperatives operated mills with daily capacity of 6,690 tons, for a 35 percent share of total U.S. crushing capacity. Average crushing capacity for all U.S. mills was 243 tons per day. Cooperative mill capacity averaged 394 tons per day, 96 percent larger than the 201-ton average for noncooperative mills.

In the South, including Appalachia, Southeast, Delta States, and Corn Belt (Missouri only), total crushing capacity was 7,565 tons per day for 41 mills. Cooperative crushing capacity totaled 2,160 tons per day for a 29 percent share of regional capacity. The 8 cooperative mills had an average capacity of 270 tons per day, 65 percent larger than the 164-ton per day for the 33 noncooperative mills. All mills in the South averaged 185 tons per day. The larger number of southern mills and their smaller size reflect the older, more traditional nature of the cotton industry there.

Total crushing capacity in the Southern Plains region, which includes Texas and Oklahoma, was 6,710 tons per day. Cooperative capacity was 2,150 tons per day, for a 32 percent share of regional crushing capacity. The 25 mills in the Southern Plains had an average daily capacity of 268 tons. The 5 cooperative mills averaged 430 tons, 89 percent larger than the 228-ton per day capacity of the 20 noncooperative mills.

Total crushing capacity in the Southwest, which includes New Mexico, Arizona, and California, was 4,650 tons per day. Cooperative mills in the region had a total capacity of 2,380 tons, for a 51 percent share of regional capacity. The 12 mills in the Southwest region had an average daily capacity of 388 tons. The four cooperative mills averaged 590 tons daily, 108 percent higher than the 284 ton average capacity of the eight noncooperative mills.

Cooperative cottonseed crushing mills are significantly larger on average than noncooperative mills. Average mill sizes in the newer cotton producing areas of the Southern Plains and the Southwest are considerably larger than the older mills in the South.

The trends in total U.S. and cooperative cottonseed crush over the past decade are shown in table 14. Total crush has maintained a rather steady average over the 1971-79 period. However, there has been considerable year-to-year variation. U.S. cottonseed crush ranged from a low in 1975 of 2,952,000 tons to a high of 4,880,000 tons in 1972.



Total cooperative crush, while displaying the same variation as total U.S. crush, has tended to increase. Cooperative share of total crush has risen steadily from 28 percent in 1971 to 39 percent in 1979.

Structural characteristics of the cottonseed crushing industry are shown in table 15. Total, average number of mills, total mill capacity, average mill capacity, and share of total capacity are shown cumulatively and for four firm groups for the largest 4, 8, and 12 firms in the cottonseed crushing industry.

The largest four firms own 23 mills or 29 percent of the cottonseed mills in the United States. The largest 8 firms own 34 mills, and the top 12 firms own 38 mills. The average number of mills owned by the largest four firms is 5.7. Firms five through eight own an average of 2.7 mills. Firms ranked below the largest eight were almost exclusively single mill operations.

In 1980, average mill size for the largest four firms was 356 tons per day. Average size for firms 5 through 8 was 299 tons per day, and for firms 9 through 12, 425 tons per day. Average mill size for the 40 mills not owned by the largest 12 firms was considerably less than half the 347-ton average for the latter group.

Total crushing capacity for the top four firms was 8,185 tons per day, representing 43.2 percent of industry total. Firms five through eight owned 3,290 tons capacity, 17.4 percent of industry total. Thus the top eight firms controlled 60.6 percent of total industry capacity. Firms 9 through 12 owned 1,700 tons per day capacity, or 9 percent of industry total; hence the top 12 firms had 69.6 percent of total industry capacity.

One cooperative, Ranchers Cotton Oil of Fresno, Calif., ranked in the top four firms. Ranchers was the only cooperative owning more than one plant. Plains Cooperative Oil Mill of Lubbock, Tex., ranked in the top eight firms. Firms 9 through 12 were all cooperatives: Producers Cooperative Oil Mill, Oklahoma City, Okla.; Yazoo Valley-Minter City Oil Mill, Greenwood, Miss.; Valley Co-op Oil Mill, Harlingen, Tex.; and Helena Cotton Oil Co., Helena, Ark.

Noncooperative firms operating more than one plant included Hartsville Oil Mill, Simmons Cotton Oil Mills, Southern Cotton Oil Co., Producers Cotton Oil (Fresno), Mississippi Cottonseed Products, Inc., Anderson Clayton, Archer-Daniels Midland (ADM), and Chickasha Cotton Oil Co.

Of the major cottonseed processing firms, only two ADM and Anderson Clayton, are significantly involved in processing other oilseeds. ADM processes soybeans, sunflower, and flaxseed. Anderson Clayton processes soybeans.

**Table 13—Regional characteristics of cottonseed crushing industry, cooperative and noncooperative mills, 1980**

Characteristic	Region			
	South <sup>1</sup>	Southern Plains	Southwest	U.S. total
	----- <i>Tons per day</i> -----			
Crushing capacity:				
All mills	7,565	6,710	4,650	18,925
Co-op mills	2,160	2,150	2,380	6,690
Co-op share of capacity (percent)	29	32	51	35
	----- <i>Mills</i> -----			
Number of mills:				
Total	41	25	12	78
Co-op	8	5	4	17
	----- <i>Tons per day</i> -----			
Average mill size:				
Co-op	270	430	590	394
Nonco-op	164	228	284	201
All mills	185	268	388	243

<sup>1</sup> Includes Alabama, Georgia, South Carolina, North Carolina, Missouri, Arkansas, Tennessee, Mississippi, Louisiana.

**Table 14—Cottonseed crush, U.S. and cooperative total; 1971-1979**

Year	U.S. crush	Cooperative crush	Cooperative share of crush
	<i>1,000 tons</i>		<i>Percent</i>
1971	3,960	1,093	28
1972	4,880	1,432	29
1973	4,792	1,374	29
1974	4,226	1,426	34
1975	2,952	1,042	35
1976	3,499	1,236	35
1977	4,313	1,604	37
1978	4,127	1,511	37
1979	4,233	1,643	39

**Table 15—Structural characteristics of the cottonseed crushing industry, 1980**

Firm grouping	Total plants	Average number of plants	Total capacity	Average plant size	Share of capacity
		<i>Tons per day</i>			<i>Percent</i>
Top 4	23	5.7	8,185	356	43.2
Firms 5-8	11	2.7	3,290	299	17.4
Top 8	34	4.2	11,475	338	60.6
Firms 9-12	4	1.0	1,700	425	9.0
Top 12	38	3.2	13,175	347	69.6
All plants	78		18,925	243	100.0

## **Sunflowerseed/Flaxseed**

Sunflowerseed and flaxseed are typically crushed in the same plant without substantial modification. Sunflowerseed, previously a secondary raw commodity for flaxseed plants, has replaced flaxseed as producers have switched crops.

Five plants crushed sunflowerseed or flaxseed in 1980. Their total capacity was 4,600 tons per day, about 80 percent of it dedicated to crushing sunflowerseed. The largest four plants are located in major production regions of Minnesota and the Dakotas. In the past, sunflowerseed has also been crushed in Texas and on the West Coast as an alternative to cottonseed.

One cooperative plant is among this group. Honeymead Products, Inc. (GTA) has a large facility at Fridley, Minn. Significant noncooperative sunflowerseed and flaxseed processors include Cargill, ADM, and Pillsbury. Two new plants, increasing U.S. sunflower crushing capacity by about 50 percent, are expected to be operating for the 1981 crop year. All new crushing capacity is planned for North Dakota.

## **Peanuts**

Peanut crushing is a minor activity within the peanut industry. Less than 20 percent of the annual peanut production is crushed with the remainder going into the edible and export markets. Most plants are small and many crush cottonseed as well as peanuts. Peanut crushing plants are located near production areas in the Southeast, Appalachia, Delta States, and Southern Plains regions.

Between 15 and 20 peanut crushing plants are presently active. About half use solvent extraction processes with the rest using an expeller process. Most plants appear to range from 50 to 250 tons per day capacity. One plant is cooperatively operated—Goldkist, Inc., at Graceville, Fla..

## **Potential New Locations for Cooperative Crushing**

The ability to process oilseeds and market the products as well as the raw commodities gives producers greater flexibility to obtain the highest value for their commodities. When crushing margins are favorable, processing is a profitable alternative to marketing raw oilseeds.

To successfully operate an oilseed processing plant, an adequate supply of raw commodity must be available at a reasonable cost. Hence, plants are usually located either within major production areas or along a major transportation route for domestic oilseed shipments. For cottonseed, sunflowerseed, flaxseed, and peanuts, cooperative processing plants are located within all major producing areas. Cooperatives operating these plants can either process

or sell raw commodities depending on relative prices, as long as fixed plant costs are covered.

Cooperatives operate processing plants in most major soybean producing areas. However, the eastern Corn Belt region—Illinois, Indiana, and Ohio—produces about 30 percent of U.S. soybeans, yet has no cooperative processing plants. In contrast, noncooperative oilseed firms operate several plants in these States.

Strong oilseed marketing cooperatives are also present in those States—Growmark, Inc., in Illinois, Indiana Farm Bureau Cooperative Association in Indiana, and Landmark, Inc., in Ohio. Each can handle large volumes of raw soybeans and sell in domestic and export markets. None has the option, however, of processing and selling products in domestic or foreign markets. A soybean processing plant could round out the soybean program of these regional cooperatives. Cooperatives in these States should examine the feasibility of establishing soybean processing operations.

## **Parts Inventory for Processing Cooperatives**

The common technologies shared by soybean and cottonseed processing plants points to the potential for establishing a jointly held processing plant parts inventory for cooperatives operating soybean or cottonseed plants. Separate ventures for the two plant types or a dual inventory with a shared administration could be started.

The inventory venture would supplement the parts inventories of individual plants. The inventory should include major parts with long order-to-delivery lead times which could cause serious disruption of plant operations. Supplemental supplies of frequently used items might also be held, allowing individual plants to slightly reduce their own inventories.

A jointly held parts inventory would require initial contributions by participating cooperatives to purchase parts, to arrange storage, and to staff and operate the facility. The inventory association would be sustained through purchase fees paid by cooperatives tapping the inventory for parts. Fees would cover costs of holding the purchased parts plus a reasonable service charge. Parts purchased from the parts inventory would then be replaced by the inventory's staff, using money paid by the purchasing cooperative.

In addition to making needed parts more readily available, a jointly held parts inventory offers several other potential benefits. Frequently used parts might be discounted when purchased in large quantity. Special parts or equipment purchases could be handled on a brokerage basis. The facility could promote and improve exchange of technical information between processing cooperatives' personnel and parts and equipment manufacturers.

## Processing Plant Output

Oilseed processing plants produce low and high protein content meal and vegetable oil - crude, or refined to varying degrees. Smaller quantities of other valuable byproducts are also produced such as lecithin in soybean processing plants and linters in cottonseed plants.

## Soybean Plant Output

Cooperative production of soybean oil at its various stages of refinement is shown in table 16 for 1971-1979. Notable in this data is the steady increase in the percentage of degummed oil produced, reflecting increasing cooperative involvement in export oil markets.

More than half of the total cooperative production of soybean oil leaves the cooperative plant as crude oil. During this period, between 20 and 25 percent of total oil production was refined beyond the degumming stage. Since more than half of the oil produced is sold as crude, most of which must go to noncooperative refiners, the oil refining stage represents a major point of product leakage from the cooperative system.

Production of soybean meal products is shown in table 17 for 1971-1979. No apparent trends in composition of meal output appear over that period, other than the increase in absolute

quantities. The production mix between high-protein and low-protein meal varied considerably from year to year as a result of changing characteristics of demand in the feed sector.

Over 90 percent of the meal produced by cooperative plants was sold in bulk each year during the 1971-1979 period. The remainder was bagged. Approximately 10 percent of the total cooperative meal production was sold or transferred to cooperative-owned feed mills with the remainder going primarily to noncooperative feed mills or sold for export.

## Cottonseed Mill Output

U.S. production of cottonseed oil is shown in table 18 for 1971-1979. As in the crush statistics, the figures vary widely but do not indicate a trend.

Cooperative oil production varied similarly to U.S. totals; however, a significant increasing trend was present.

Cooperative share of U.S. oil production increased from 27 percent in 1971 to 36 percent in 1979.

Refined oil accounted for most of the cooperative cottonseed mills' increase in total oil production, growing from 46 percent of total cooperative cottonseed oil production in 1971 to 64 percent in 1979. Increased refining improved the ability of cottonseed cooperatives to market oil to a wider variety of buyers.

**Table 16—Production of soybean oil and oil products by cooperatives, 1971-1979 crop years**

Year	Total oil production	Crude oil	Degummed oil	Lecithin and by-products	Refined oil	Hydrogenated oil
Million pounds						
1971	1,470.9	691.3	205.9	-	1,573.7	-
1972	1,367.8	779.6	246.2	-	1,342.0	-
1973	1,418.3	765.9	312.0	-	1,340.4	-
1974	1,317.8	764.3	263.6	13.2	118.6	158.1
1975	1,857.6	1,077.4	334.4	18.6	204.3	222.9
1976	1,944.2	1,088.8	388.8	19.4	213.9	233.3
1977	2,193.1	1,188.7	526.3	24.1	293.9	160.1
1978	2,389.4	1,309.4	563.9	9.6	267.6	238.9
1979	2,374.7	1,289.5	588.9	11.9	261.2	223.2
Percent						
1971	100.0	47.0	14.0	-	1 39.0	-
1972	100.0	57.0	18.0	-	1 25.0	-
1973	100.0	54.0	22.0	-	1 24.0	-
1974	100.0	58.0	20.0	-	9.0	12.0
1975	100.0	58.0	18.0	1.0	11.0	12.0
1976	100.0	56.0	20.0	1.0	11.0	12.0
1977	100.0	54.2	24.0	1.1	13.4	7.3
1978	100.0	54.8	23.6	0.4	11.2	10.0
1979	100.0	54.3	24.8	0.5	11.0	9.4

<sup>1</sup> Combined data for refined, hydrogenated, lecithin, and byproducts.

**Table 17—Soybean meal production by cooperatives, 1971-1979 marketing years**

Year	Total meal production	High protein meal production	Low protein meal production	Mill feed production
1,000 tons				
1971	3,234.1	1,940.5	1,164.3	129.4
1972	3,110.2	1,741.7	1,244.1	124.4
1973	3,074.9	1,383.7	1,568.2	123.0
1974	2,945.9	1,090.0	1,738.1	117.8
1975	4,087.7	1,716.8	2,207.4	163.5
1976	4,167.1	1,958.5	2,000.2	208.4
1977	4,815.7	2,220.0	2,412.7	183.0
1978	5,189.3	2,547.9	2,392.3	249.1
1979	5,261.3	2,609.6	2,393.9	257.8
Percent				
1971	100.0	60.0	36.0	4.0
1972	100.0	56.0	40.0	4.0
1973	100.0	45.0	51.0	4.0
1974	100.0	37.0	59.0	4.0
1975	100.0	42.0	54.0	4.0
1976	100.0	47.0	48.0	5.0
1977	100.0	46.1	50.1	3.8
1978	100.0	49.1	46.1	4.8
1979	100.0	49.6	45.5	4.9



**Table 18—Cottonseed oil production, U.S. and cooperatives 1971-1979 crop years**

Year	U.S. total oil production	Cooperatives			Cooperative share of total oil production
	Crude production	Refined production	Total production		
	<i>Million pounds</i>				<i>Percent</i>
1971	1,307	191	165	356	27
1972	1,564	216	246	462	30
1973	1,552	201	255	456	29
1974	1,335	171	269	440	33
1975	920	122	200	322	35
1976	1,198	141	258	399	33
1977	1,453	215	282	497	34
1978	1,282	186	303	489	38
1979	1,423	183	330	513	36

**Table 19—Cottonseed meal production, U.S. and cooperatives, 1971-1979 marketing years**

Year	U.S. meal production	Cooperative meal production	Cooperative share of cottonseed meal production
	<i>1,000 tons</i>		<i>Percent</i>
1971	1,794	503	28
1972	2,224	661	30
1973	2,176	632	29
1974	1,885	633	34
1975	1,315	462	35
1976	1,570	555	35
1977	1,976	705	36
1978	1,955	717	37
1979	1,724	728	42

Production of cottonseed meal by cooperatives and all U.S. mills is shown in table 19 for 1971 through 1979. Wide variation with no apparent trend characterized meal production, as was true for oil and total crush. Cooperative meal production increased over this period by 45 percent, from 503,000 tons in 1971 to 728,000 tons in 1979. Cooperative share of cottonseed meal production increased from 28 percent in 1971 to 42 percent in 1979.

### Processing Plant Costs

Oilseed processing cooperatives will generate savings from crushing operations when the difference between the price of raw oilseeds and those of processed oilseed products exceeds the cost of processing. Since for most oilseed processing cooperatives, prices on both sides of this processing margin are market-determined, processing costs may or may not be

covered at a particular time. Cooperatives operating oilseed pools have no fixed price for incoming raw oilseeds. The net price paid members by the pool represents the gross sales price of products made from the raw oilseeds in the pool less processing, marketing, and finance costs. Processing costs directly affect the costs of procuring raw oilseed commodities from pool members. Thus minimizing processing costs becomes extremely important to both buy-sell and pooling cooperatives.

### Soybean Plant Costs

The average per-bushel cost of processing soybeans for cooperative plants using solvent extraction technologies is shown in table 20 for 1971 through 1979. Total processing costs are broken down into major categories: Manufacturing costs, general and administrative expense, and financial expenses and corporate overhead.

Total processing costs per bushel increased 151 percent between 1971 and 1979 from \$.2333 to \$.5860 per bushel. The \$.3527 per bushel average increase in total processing cost resulted from a 142 percent increase in manufacturing costs, a 41 percent increase in general and administrative expense, and a 345 percent increase in financial and corporate overhead expenses.

Major increases in specific cost items occurred for wages, payroll taxes and fringes, power, fuel, repairs, solvent, and interest. These components' share of costs changed considerably over the 1970's. Labor costs, as a percentage of per bushel manufacturing costs, fell from 33 percent in 1971 to 24 percent in 1979. Fuel oil and natural gas costs increased from 12 to 20 percent of manufacturing costs. Electric power's share of total cost was fairly steady, up from 9.9 percent in 1971 to 10.3 percent in 1979. Repairs rose from 11 percent to 14 percent. Hexane's share of total cost rose from 4 percent in 1971 to 7 percent in 1979.

### Cottonseed Plant Costs

Processing costs per ton of cottonseed crushed for cooperative screw press plants are shown in table 21 for alternate years 1973 through 1979. Over this period, total processing costs increased by 74 percent, from \$27.02 per ton in 1973/74 to \$46.98 per ton in 1979/80. The \$19.96 increase in average total processing costs was composed of a \$15.44 increase in manufacturing cost, a \$1.88 increase in general and administrative expense, and a \$2.64 increase in financial expense.

The largest increases in costs for cooperative screw press plants were for wages, fringes, and payroll taxes—up 78 percent; power, fuel, and water—up 182 percent; product packaging materials—up 270 percent; general and administrative salaries, fringes, and payroll taxes—up 117 percent; and financial expense—up 136 percent.

**Table 20—Processing costs for cooperative soybean processing plants, 1971-1979, alternate crop years**

Cost and expense item	Crop year				
	1971/72	1973/74	1975/76	1977/78	1979/80 <sup>1</sup>
<i>----- Dollars per bushel -----</i>					
Manufacturing costs:					
Wages, payroll taxes, fringes	.0561	.0675	.0660	.0768	.0999
Insurance	.0057	.0151	.0066	.0103	.0081
Property taxes	.0058	.0054	.0107	.0073	.0071
Power	.0168	.0201	.0360	.0407	.0422
Steam	<sup>1</sup>	<sup>1</sup>	<sup>1</sup>	<sup>2</sup>	.0064
Water and sewage	<sup>1</sup>	<sup>1</sup>	<sup>1</sup>	.0014	.0031
Fuel	.0200	.0283	.0390	.0686	.0828
Plant supplies	.0042	.0115	.0090	.0069	.0162
Repairs	.0184	.0239	.0268	.0504	.0585
Depreciation	.0302	.0368	.0400	.0507	.0453
Solvent	.079	.0131	.0131	.0146	.0287
Miscellaneous	.0039	.0103	.0215	.0151	.0060
Total manufacturing	.1690	.2242	.2665	.3299	.4092
General and administrative expense:					
Salaries, payroll taxes, fringes	.0207	.0257	.0231	.0229	.0367
Travel, directors fees, meetings	.0014	.0020	.0018	.0016	.0026
Advertising	.0003	.0007	.0006	.0002	.0003
Dues, subscriptions, donations	.0007	.0011	.0012	.0010	.0007
Telephone, telegraph	.0026	.0031	.0033	.0033	.0033
Supplies	.0013	.0020	.0018	.0016	.0014
Legal, audit	.0004	.0007	.0002	.0002	.0014
Miscellaneous	.0091	.0122	.0188	.0239	.0054
Total G and A	.0366	.0478	.0522	.0551	.0517
Financial expenses, corporate overhead	.0277	.0583	.0513	.0679	.1232
Total costs and expenses	.2333	.3025	.3699	.4528	.5860

<sup>1</sup>1979/80 data includes processing and refining costs for two plants not represented in previous years. Major cost summaries for 13 plants included in all years of table 15 data were: Manufacturing costs, \$.3695; general and administrative costs, \$.0441; financial expenses and corporate overhead; \$.0825, and total costs and expenses, \$.5211.

Processing costs per ton of cottonseed crushed by cooperative solvent extraction plants are shown in table 22 for alternate years, 1973 through 1979. Over this period total processing costs increased 89 percent from \$24.66 per ton in 1973/74 to \$46.60 per ton in 1979/80. The \$21.94 increase in total processing costs included a \$16.96 increase in manufacturing costs, a \$1.93 increase in general and administrative expense, and a \$3.05 increase in financial expense.

The largest cost increases for solvent extraction plants were for wages, fringes and payroll taxes—up 88 percent; power, fuel, and water—up 153 percent; repairs—up 70 percent; mill supplies—up 179 percent; product packaging materials—up 329 percent; solvent—up 207 percent; general and administrative salaries, fringes, and payroll taxes—up 53 percent; and financial expense—up 93 percent.

Comparison between processing costs of screw press plants and solvent extraction plants is inconclusive. Total processing

costs for solvent extraction plants averaged \$.30 per ton lower than screw press plants: however, the difference is not significant. Screw press plants had slightly higher per ton manufacturing cost and general and administrative expense, and lower financial expense. The major cost difference between the two plant types was in the labor and office wages, fringes, and payroll taxes. This reflects the generally smaller, more labor intensive operations of screw press plants. Comparisons between processing costs of the two plant types must consider their differences in oil recovery rates. Less oil is recovered by screw press plants.

### Economies of Scale

The choice of proper size for oilseed processing plants is critical to the cooperative or noncooperative firm. Plant size should be chosen to minimize the total cost of processing. To remain competitive, the processing plant must be at least large enough to capture any cost savings associated with size, yet



**Table 21—Cottonseed processing cost per ton for screw press cooperative plants, 1973-1979 alternate year**

Cost and expense item	Year			
	1973/74	1975/76	1977/78	1979/80
<i>----- Dollars per ton -----</i>				
Manufacturing costs:				
Wages, fringes, payroll taxes	9.14	13.86	13.04	16.26
Power, fuel, water	2.69	4.90	5.52	7.59
Repairs	3.49	2.27	2.81	3.76
Depreciation	2.04	4.34	2.15	2.11
Mill supplies	.63	.77	.76	.61
Insurance	1.32	2.24	1.27	2.00
Laboratory and analysis	.21	.25	.25	.24
Product packaging materials	.56	.73	.77	2.07
Miscellaneous	.09	.15	.51	.97
Total manufacturing cost	20.17	29.51	27.08	35.61
General and administrative:				
Salaries, fringes, payroll taxes	2.26	4.52	3.40	4.90
Brokerage fees	.37	.28	.28	.25
Taxes and licenses	.69	.98	.52	.43
Transportation-travel	.30	.38	.14	.23
Telephone, telegraph	.14	.18	.12	.14
Dues, subscriptions, advertising	.27	.27	.22	.35
Legal, audit	.11	.18	.18	.19
Office supplies	.13	.27	.17	.13
Miscellaneous	.64	1.20	.37	.17
Total G and A	4.91	8.26	5.40	6.79
Financial expenses	1.94	1.14	1.47	4.58
Total processing costs	27.02	38.91	33.95	46.98

not so large as to experience increasing costs due to on-site congestion, procurement, assembly, or technological limits. Capture of economies of scale has been credited as causing the decrease in U.S. plant numbers for both soybean and cottonseed processing plants.

Technological economies of scale relate solely to the cost of transforming the raw oilseed into oilseed products. Total in-plant per unit processing costs are thought to decrease as plant size increases, up to a point, after which no further decreases in per unit processing costs may be obtained. This point defines the minimum technologically optimal plant size. Most industry experts, some limited studies, and the information available on recent plant investment decisions indicate this plant size to be in the 1,200 to 1,800 tons-per-day range for new soybean plants and about 1000 tons-per-day for new cottonseed and sunflower plants. The largest U.S. soybean plant has about 4,000 tons-per-day capacity. The largest cottonseed plant crushes about 1,000 tons per day. Whether an upper size limit exists where technological diseconomies of scale begin to develop in processing plants is not known.

**Table 22—Cottonseed processing cost per ton, solvent extraction cooperative plants, 1973-1979 alternate years**

Cost and expense item	Year			
	1973/74	1975/76	1977/78	1979/80
<i>----- Dollars per ton -----</i>				
Manufacturing costs:				
Wages, fringes, payroll taxes	6.69	9.33	9.83	12.55
Power, fuel, water	2.91	4.87	6.85	7.35
Repairs	2.21	3.71	3.75	3.76
Depreciation	2.22	3.97	2.71	2.62
Mill supplies	.53	1.67	1.12	1.48
Insurance	1.27	1.78	1.58	1.87
Laboratory and analysis	.31	.37	.40	.45
Product packaging materials	.41	.53	.51	1.76
Solvent	.55	.75	1.05	1.69
Miscellaneous	.05	.05	.72	.58
Total manufacturing cost	17.15	27.03	28.52	34.11
General and administrative:				
Salaries, fringes, payroll taxes	2.10	2.75	2.69	3.21
Brokerage fees	.46	.49	.49	.55
Taxes and licenses	.47	1.07	.61	.65
Transportation-travel	.30	.52	.28	.31
Telephone, telegraph	.08	.16	.14	.14
Dues, subscriptions, advertising	.24	.36	.31	.33
Legal, audit	.08	.20	.12	.19
Office supplies	.12	.27	.24	.27
Miscellaneous	.37	.93	.29	.50
Total G and A	4.22	6.75	5.16	6.15
Financial expenses	3.29	3.72	3.21	6.34
Total processing costs	24.66	37.50	36.89	46.60

Procurement and assembly costs are the expense of obtaining the raw oilseed commodity and delivering it to the plant site. As a general rule, the larger the area from which the plant must draw raw oilseeds, the higher will be the average per unit procurement and assembly cost. Production density, or the amount of raw oilseed produced per square mile, thus becomes a crucial consideration in determining plant size for a particular location. The increasing procurement and assembly costs to obtain necessary volumes for a larger plant may offset cost savings achieved through capture of technological economies of scale.

## Raw Product Marketing

Meal and oil outputs of processing plants must either be transferred to further stages within the cooperative or sold. Meal may be sent to cooperative feed mills, sold to other feed mills in a fairly local area, shipped to major feed ingredient markets, or sold for export. Oil typically lacks a local market so it is usually sold to more distant buyers.

Cooperatives have generally been able to handle local sales. Sales to more distant buyers involves creating a more complex sales organization at significant costs. Cooperative soybean, cottonseed, and sunflowerseed/flaxseed processors recognized the importance of not duplicating these sales efforts, and thus acted together to create a sales agency for their meal and oil products. Soy-Cot Sales, Inc., of Des Plaines, Ill., was formed in 1963 to handle domestic sales of oil and meal. Soy-Cot has grown steadily to the point where it currently sells the vast majority of cooperative-produced oil and a significant portion of cooperative meal. Soy Cot has recently expanded its export role to include oil storage facilities on the Gulf. Cooperatives' commitment to their joint effort in Soy Cot Sales created a marketing success, which in turn strengthened the cooperatives' support of the organization.

## Oilseed Pricing Mechanisms

Raw oilseed prices are derived from the prices of meal and oil products and the cost of transporting them to final markets. The dominant price discovery points in the oilseeds complex are the soybean, soybean oil, and soybean meal futures trading pits at the Chicago Board of Trade and the sunflowerseed futures market at the Minneapolis Grain Exchange. There, representatives of major buyers and sellers in the oilseed complex bargain for price in a public arena. Prices determined through the trading process represent the best assessment of true commodity values in the near future, given all current information.

Prices set in oilseed futures markets serve as a guideline or base for pricing at many levels in the oilseed industry. Local elevators frequently set bid prices for farmers' soybeans and sunflowerseed as a specified amount less than futures price. The difference between futures price and local cash price represents the local elevator's expected costs of storage and of transporting raw commodities to the elevator's buyers. Generally, the further an elevator is from its buyers, the wider the cash-futures price difference.

The market value of processing services may be determined by the futures market. The difference between the price per bushel of raw commodity and the value of product output per bushel represents the processing margin. If actual processing costs are less than processing margins, money may be made through processing and selling meal and oil. If actual processing costs are more than processing margins, money is lost on processing and the firm might be better off by selling the raw commodity. Processors are constrained in their ability to sell raw instead of processed commodities by their need to cover at least fixed plant costs.

Through the futures markets, expected prices for soybeans, soybean products, and sunflowerseed are directly determined in an open, competitive market. Prices for cottonseed,

sunflowerseed, flaxseed, and peanut products are also determined indirectly as substitutes for the traded commodities. Thus, oilseed prices are generally set in competitive markets until the product refining stages are reached. Then prices become less publicly determined. Individual sales negotiations and internal transfer pricing within vertically integrated organizations become the primary pricing mechanisms. Costs will affect margins and prices more than the forces of supply and demand.

Cooperatives at the local elevator and processing levels usually obtain oilseeds through cash transactions guided by futures market prices. Various pooling methods are frequently used for cottonseed and occasionally for soybeans. Marketing contracts have been used for all oilseed commodities but are of declining significance.

Local cooperative elevators, cooperative processors, and cooperative exporters frequently use the futures markets to hedge their cash transactions against undesirable market changes. Through hedging, cooperatives may reduce their exposure to risks of fluctuating prices. Hedging through the futures markets is most frequently done by cooperative exporters and processors, although local cooperatives use the futures market regularly. Local cooperative futures trading tends to be simple, straightforward hedging, selling contracts on purchase of cash commodities and buying contracts when the commodity is sold. Futures transactions by processors and exporters are usually much more complex, involving margin hedging, reverse margin hedging, and intertemporal spreads.

Cooperatives have combined to create and operate organizations to carry out their futures transactions. Illinois Cooperative Futures Co., of Chicago, Ill. is owned and operated by 70 regional and 35 local cooperatives on a fee basis. Ninety-five percent of ICFC's volume is from regional cooperatives, reflecting their larger size and numbers.

Farmers Commodities Corp., of Des Moines, Iowa, performs futures trading services for over 500 local elevators and individual farmers primarily through offices in Des Moines, Mason City, and Sioux City, Iowa, and Bloomington, Ill. Trading services are provided and futures market education and advice is given. Farmers Commodities Corp., a subsidiary of Far-Mar-Co and Agri Industries, also advises and educates its patrons about the futures markets. Other regional cooperatives have established similar services for their members.

In addition to buy-sell cash and futures trading, the cooperative organization may determine prices for raw commodities in another way. Commodities may be pooled for sale with the final price to members being determined from the commodity's sales value. A seasonal pool is a long-term, market-oriented program where members agree to deliver to the pool and receive an initial or advance payment for a



portion of the expected final price. Subsequent payments are made as pool inventories are sold. Shorter term pools may also be formed where producers typically receive a daily or weekly pool price upon delivery of their commodity. Short term pools are frequently called purchase or call pools. Through pooling, members receive an average price frequently higher than marketwide average due to the expertise of the pool's management, larger volumes, and greatly increased marketing flexibility.

Goldkist Inc. and Riceland Foods operate seasonal pools. Riceland operates a purchase pool for soybeans as well. Most cottonseed mills pay member gins on a pooled basis, though payment methods vary considerably.

## Transportation of Oilseeds and Oilseed Products

Transportation is a key function of firms in the oilseeds complex. Moving of oilseeds from the farm through marketing and processing channels requires a high degree of coordination and a complete and working transportation system.

The mode of transportation used at a particular level depends on the quantity of commodity involved and the distance it must travel. In general, trucks are the most cost-effective for short hauls. Trains and barges become more cost effective as distances and quantities increase.

### Cooperative Control of Transportation Modes

Because of the recent railcar shortages and delays in car turnaround, cooperatives are increasingly providing their own railcars and barges. (For example, the rail car fleet of regional grain and oilseed cooperatives has risen almost threefold from 2,330 cars in 1973 to 6,833 in 1979. Of these 20 regional cooperatives, seven process oilseeds.)

Most cooperative-controlled cars—in 1979, 6068 cars or 89 percent—are of the jumbo hopper variety (table 23). Of this

**Table 23—Transportation equipment owned or leased by regional and interregional cooperatives, 1973-1979**

Year	Rail cars				River barges	
	Jumbo hopper cars owned	Tank cars leased	Tank cars leased	Total	Barges owned or leased	Tow boats owned
1973	116	2,214	N/A	2,330	60	0
1975	120	3,971	208	4,299	212	7
1977	115	2,516	486	3,117	322	9
1979	115	6,068	650	6,833	337	9

N/A - Data not available.

Source: U.S. Department of Agriculture, *Regional Grain Cooperatives*, various years, Agricultural Cooperative Service.

total, cooperatives owned only 115 cars. They leased the remainder. The number of cars owned by cooperatives has not changed substantially since 1973 reflecting the cooperatives' preference to lease rather than own cars in effort to minimize the amount of capital tied up in rail cars in relation to other investments.

Cooperatives use jumbo hopper cars to ship the raw commodities and bulk processed products. Oilseeds must compete with other major feed and food grains, such as corn, milo, and wheat, for use of these cars.

The regional cooperative controlled tank car fleet has grown significantly, up more than threefold from 208 cars in 1975 to 650 in 1979. These tank cars are used primarily for shipping vegetable oil and farm chemicals, with the latter usage perhaps more dominant.

Some cooperatives handling oilseeds have also moved into river barging over the past few years. Cooperatives owned or leased 337 barges in 1979, a more than fivefold increase over the 60 barges controlled in 1973. Cooperatives have come to control nine barge tow boats in that time period.

Most cooperative involvement in barge activities has been through a cooperative barge line, Agri-Trans Corp. Agri-Trans was formed in 1974 by five grain and oilseed marketing cooperatives and one national fertilizer manufacturing cooperative. Through this federated transportation cooperative, the regionals involved may now use their river terminal facilities more efficiently due to the greater dependability and cost stability of the barge service. Grains and oilseeds are barged downstream and the fertilizer manufacturing cooperative provides the upstream backhaul needed to maximize use of the barges.

### Transportation by Cooperative Soybean Processors

Cooperative soybean processors receive soybeans by rail or truck, depending primarily on the availability of soybeans for crushing in nearby production areas. Cooperatives in high density soybean production areas generally receive most of their beans by truck from nearby elevators and farms. Cooperative processing plants in low production or deficit areas receive a higher proportion of their soybeans by rail. One cooperative plant situated on a river received some by barge.

Rail was the most important of the three receiving methods until about 1973 when noncooperative owned trucks delivered the highest portion of total receipts (table 24). Rail receipts represented more than half of total receipts in most years until 1970. As a percent of total, rail receipts decreased every year from 1971 at 47 percent to 16 percent in 1979. Noncooperative trucks picked up much of the burden,

**Table 24—Soybean receiving methods by cooperative plants, 1971-1979 crop years**

Year	Transportation mode		
	Rail	Cooperative-owned truck	Other <sup>1</sup> truck
	Percent		
1971	47	7	46
1972	39	9	52
1973	30	10	60
1974	31	9	61
1975	27	12	60
1976	24	21	54
1979 <sup>2</sup>	16	6	77

<sup>1</sup> Includes data from one plant receiving soybeans by barge.

<sup>2</sup> Data not available for 1977 and 1978.

increasing their share of receipts by about 20 percent over that time period. Receipts from mill owned trucks showed lesser, yet significant increases during that time.

The percentages of total soybean meal shipments using rail, mill owned truck only, other truck only, or truck-barge combinations for 1971 to 1979 are shown in table 25. Trends are very similar to those seen in soybeans.

The percentage of meal cooperative soybean plants shipped by rail trended downward during the 1971-1979 period. The percentage of meal shipped by rail dropped below 50 percent in 1971 and below 40 percent in 1976.

Noncooperative owned-trucks picked up most of the meal shipments railroads lost over the past 10 years. Noncooperative truck share of shipments has risen from 30 percent in 1971 to 44 percent during 1979.

The percentages of meal shipped by mill owned truck and by truck-barge combinations have remained fairly constant during the 1971 to 1979 period, generally falling in the 8 to 14 percent range.

The percentages of oil shipped by rail, truck, or barge either alone or in truck-barge combination are shown in table 26 for the 1971-79 period. Different trends are indicated for oil than for raw soybeans and meal.

The percentage of oil shipped by rail moved slightly upward over the decade. In 1975, a peak 74 percent of all oil shipped by cooperatives moved by rail. This share dropped to 62 percent by 1979 for a 1 percent gain in rail oil shipment share in the 1970's.

Shipments of oil by truck remained a steady 15 to 16 percent in the 1971-1979 period. Barge shipments of oil decreased slightly over the decade.

Soybeans received and meal shipped by rail have decreased in total volume as well as share of total cooperative shipments. Cooperatives increasing dependence on trucks for soybean and soybean products is even more impressive when the larger absolute volumes are considered.

The decreasing share of receipts by rail indicates two developments over the 1970s: Difficulty in getting railcars, and the disappearance of in-transit privileges. The loss of in-transit privileges, which allowed cooperative processors to receive beans by rail and load out processed products as if no stop were made, has resulted in trucks being relatively less expensive to use.

The continued importance of rail for oil shipments reflects the relatively greater increase in exports of oil products. The dominance of trucks for meal shipments reflects the more local nature of soybean meal markets, particularly for cooperative soybean processors in the livestock producing areas of the Corn Belt.

**Table 25—Soybean meal shipment methods by cooperative plants, 1971-1979**

Crop year	Transportation mode			
	Rail	Co-op truck	Other truck	Barge <sup>1</sup>
	Percent			
1971	46	12	30	12
1972	44	12	36	8
1973	46	14	32	8
1974	43	14	35	16
1975	42	9	33	16
1976	37	14	37	12
1979 <sup>2</sup>	35	9	44	14

<sup>1</sup> Includes some rail-barge and truck-barge combinations.

<sup>2</sup> Data not available for 1977 and 1978.

**Table 26—Soybean oil shipment methods by cooperative plants, 1971-1979 crop years**

Year	Transportation mode		
	Rail	Truck	Barge <sup>1</sup>
	Percent		
1971	61	15	24
1972	60	14	26
1973	64	16	20
1974	74	14	12
1975	66	17	17
1976	62	16	22
1979 <sup>2</sup>	62	16	22

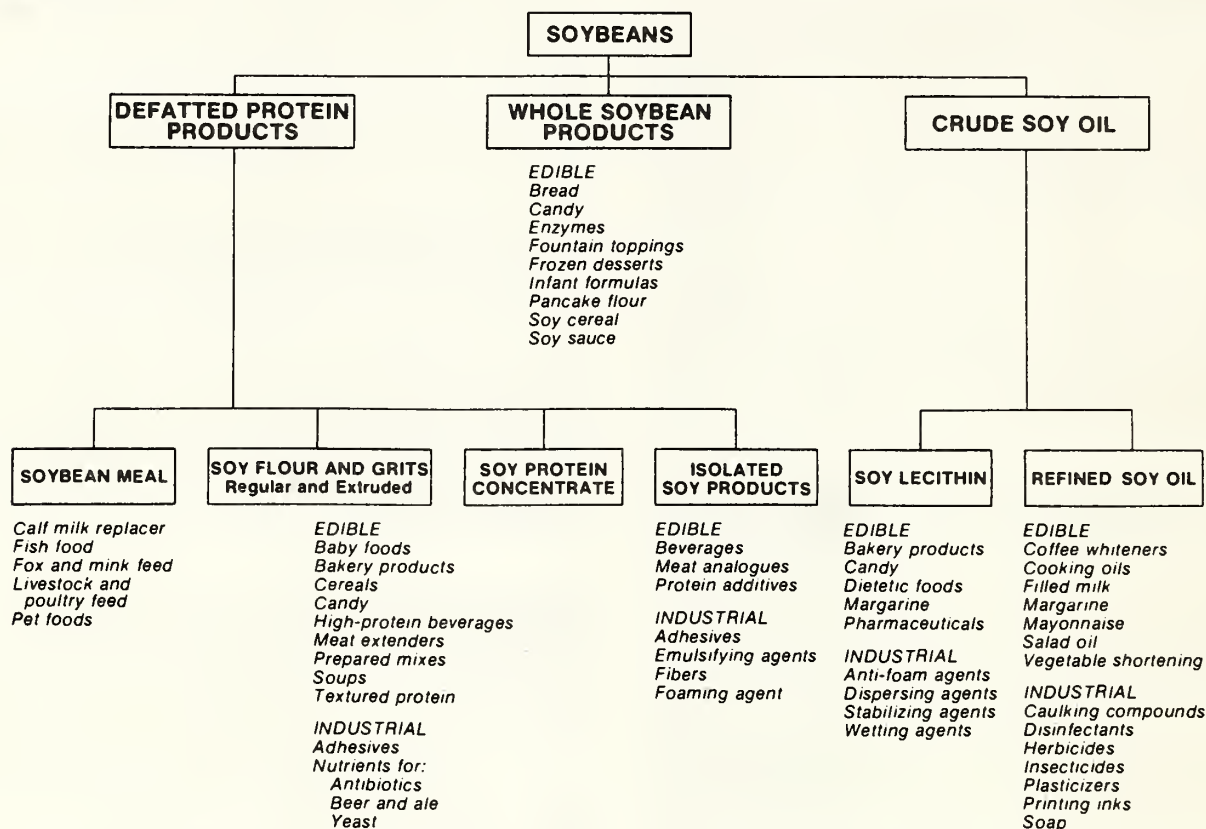
<sup>1</sup> Includes rail-barge and truck-barge combinations.

<sup>2</sup> Data not available for 1977 and 1978.



Figure 9

## Soybean Products



Federal Reserve Bank Of Chicago

## Refining, Product Manufacturing, and Marketing

Once the oilseed commodity has been processed, its outputs, oil and meal, go through various further refining and processing stages. Figure 9 shows the wide variety of soybean products for both food and technical-industrial uses.

Alternative processing treatments will result in end products composed of both the meal and oil. Meals are used primarily in animal feeds and human foods. Oils are used mostly for edible products such as shortening, margarine, and salad and cooking oils. Less than one-fifth of total domestic vegetable oil production goes into nonedible uses.

Final product dispositions for soybean, cottonseed, and peanut oil are shown in tables 27, 28, and 29.

## Demand for Vegetable Oil Products

Fats and oils consumption per capita increased 18 percent between 1963 and 1979, from 71.9 to 85.9 pounds (table 30). Consumption of butter and lard declined while margarine,

shortening, and salad and cooking oils all grew significantly. This shift has occurred for several reasons: (1) Animal fats were the dominant fat source until soybeans were more widely grown in the mid-1950's. With increased plantings, the price of soybean oil became competitive with other sources of fats and oils; (2) Consumers also became more aware of their diets and started to choose vegetable oils that are lower in cholesterol and saturated fats than animal fats; (3) The process of hydrogenating allowed vegetable oils to be used as the sole oil in shortening; and (4) Margarine gained acceptance as a substitute for butter. This took considerable time for many States had laws governing the taste and color of margarine. Its quality was often lower than that of butter. Margarine's improved quality, lower price, and the introduction of soft spreads have increased margarine sales at the expense of butter.

Price and availability determine which vegetable oil is used to produce the various edible oil products. Odor and cloud point also influence the choice of oil. All these factors make soybean oil the dominant edible oil. Fats and oils used to

manufacture margarine and shortening are shown in tables 31 and 32. Soybean oil's share of total margarine production increased from 72 percent in 1965 to 82 percent in 1979.

Soybean oil's share of shortening production increased from 53 to 64 percent over the same time period. Soybean oil and oil derived from crops (such as sunflower) planted in direct response to the demand for oil will take a major share of future increases in demand for U.S. edible oils.

### Vegetable Oil Refining

The vegetable oil refining industry is composed of firms which process crude vegetable oil in preparation for its various food and industrial uses. Refining involves a continuous series of processes in which the odor, color, clarity, and physical stability characteristics of the oil are altered. All refining steps may or may not be undertaken depending on the type of oil processed and its final use.

In refining, nonfatty materials or gum, color bodies or pigments, and free fatty acids are removed. The oil is purified using an alkali—usually caustic soda—or a steam operation. Most crude cottonseed oil is refined using a miscella process. Impurities removed from the oil are referred to as soapstock and used in soap and glycerine products. The purified oil is then bleached, winterized, and deodorized. If the final oil product is to take a solid form, the hydrogenation step is required. A summary of the refining processes and end products is shown in figure 10.

Vegetable oil refineries are usually located at and operate in conjunction with oilseed processing plants. This reduces delivery costs on low margin, large volume, crude vegetable oil. The refineries process the crude or degummed oil further, often making several oil products at a single plant. Cooking oil and shortening require little further processing and are almost always produced at the refinery. Margarine is also often made at the plant site as it is 80 percent oil by weight. Since refined oil comprises a smaller percentage of salad dressing and mayonnaise, they are more frequently made at sites closer to final markets and sources of other ingredients.

A 1975 USDA study identified 97 vegetable oil refineries in the United States (figure 11). Alkali processing was used by plants with 96 percent of total U.S. capacity. Steam processing was used by 2.4 percent of the plants, and 1.7 percent used miscella. A large proportion of the refineries are located in the Corn Belt where soybean production is dominant. A number of plants are also located in cotton producing areas.

The 1975 study indicated a wide variety in size of vegetable oil refineries. The 67 alkali plants had an average capacity of 244 million pounds of oil per year, representing the crude oil output from a soybean processing plant of 2,000-to-2,500-tons-per-day capacity. The 17 steam refineries' capacities averaged 24 million pounds per year. The six miscella refineries had average capacities of 50 million pounds of oil representing the output from a cottonseed plant of 450-tons per-day capacity.

Table 27—U. S. utilization of soybean oil, by products, by crop years, 1964-1979

Year beginning	Food				Total food	Total non- food <sup>1</sup>	Total domestic disappearance
	Shortening	Salad and cooking oil	Margarine	Other edible			
<i>Million Pounds</i>							
1964	1,404	1,100	1,107	32	3,643	426	4,069
1965	1,739	1,200	1,241	39	4,218	469	4,687
1966	1,691	1,353	1,273	59	4,375	462	4,837
1967	1,816	1,494	1,234	44	4,587	508	5,096
1968	1,979	1,978	1,290	36	5,283	474	5,756
1969	2,255	2,150	1,415	37	5,856	472	6,328
1970	2,077	2,288	1,381	34	5,780	473	6,253
1971	2,089	2,469	1,413	37	6,009	430	6,439
1972	2,230	2,469	1,491	39	6,229	457	6,685
1973	2,321	2,884	1,513	29	6,748	508	7,255
1974	1,882	2,680	1,486	22	6,070	448	6,518
1975	2,416	3,274	1,691	24	7,405	501	7,906
1976	2,189	3,165	1,568	25	6,947	507	7,454
1977	2,433	3,568	1,592	29	7,621	549	8,170
1978	2,479	3,825	1,593	29	7,927	248 <sup>2</sup>	8,175
1979	2,680	4,060	1,643	38	8,421	235 <sup>2</sup>	8,656

<sup>1</sup> Non-food products include soap, paint and varnish, fatty acids, feed, resins and plastics, lubricants and similar oils, and other inedible products.

<sup>2</sup> Data not consistent due to change in classification.

Source: *Fats and Oils Situation*, selected issues.

Table 28—U. S. utilization of cottonseed oil, by products, by crop years, 1964-1979

Year beginning	Food				Total food	Total non- food <sup>1</sup>	Total domestic disappearance
	Shortening	Salad and cooking oil	Margarine	Other edible <sup>2</sup>			
	<i>Million Pounds</i>						
1964	369	955	105	<sup>2</sup>	1,428	127	1,555
1965	438	801	119	126	1,484	106	1,589
1966	278	633	84	82	1,076	81	1,157
1967	256	570	72	124	1,023	67	1,090
1968	227	495	72	164	958	73	1,031
1969	295	533	69	81	978	74	1,052
1970	194	479	64	68	805	85	890
1971	173	418	65	77	733	101	834
1972	189	570	63	33	856	124	980
1973	214	578	62	35	889	103	991
1974	159	312	48	<sup>2</sup>	518	104	622
1975	131	207	49	<sup>2</sup>	387	64	451
1976	151	273	46	<sup>2</sup>	469	63	532
1977	180	360	45	<sup>2</sup>	584	105	689
1978	188	447	42	14	691	6	697
1979	169	403	25	14	612	6	618

<sup>1</sup> Non-food products include soap, paint and varnish, fatty acids, feed, resins and plastics, lubricants and similar oils, and other inedible products.

<sup>2</sup> Data not available for 1974-1977.

Source: *Fats and Oils Situation*, selected issues.

Table 29—U. S. utilization of peanut oil, by products, by crop years, 1964-1978

Year beginning	Food				Total food	Total non-food <sup>1</sup>	Total domestic disappearance
	Shortening	Salad and cooking oil	Margarine	Other edible			
	Million Pounds						
1964	3	48	5	-3	52	7	59
1965	10	103	6	4	123	10	133
1966	22	124	6	5	158	14	172
1967	25	157	4	13	199	12	211
1968	16	132	3	6	158	11	168
1969	16	131	<sup>2</sup>	-5	141	10	151
1970	15	156	<sup>2</sup>	10	181	12	193
1971	15	160	<sup>2</sup>	13	188	12	200
1972	15	123	<sup>2</sup>	13	151	11	162
1973	23	111	2	5	138	11	150
1974	12	91	2	64	167	8	175
1975	31	150	32	12	225	12	237
1976	26	162	23	46	257	8	265
1977	18	190	2	-39	169	10	179
1978	<sup>3</sup>	150	2	16	166	3	169

<sup>1</sup> Nonfood products include soap, paint and varnish, fatty acids, feed, resins and plastics, lubricants and similar oils, and other inedible products.

<sup>2</sup> Data not available.

<sup>3</sup> Shortening included in other edible.

Source: *Fats and Oils Situation*, selected issues.

**Table 30—Total and per capita consumption of fats and oils, food and industrial products, United States, 1963-1979**

Year	Butter <sup>1</sup>		Lard		Margarine <sup>2</sup>		Shortening		Edible Oils <sup>3</sup>		All Food <sup>4</sup> Products		All Industrial Products		All Products	
	Total	Per Capita	Total	Per Capita	Total	Per Capita	Total	Per Capita	Total	Per Capita	Total	Per Capita	Total	Per Capita	Total	Per Capita
	<i>mil</i> <i>lbs</i>	<i>lbs</i>	<i>mil</i> <i>lbs</i>	<i>lbs</i>	<i>mil</i> <i>lbs</i>	<i>lbs</i>	<i>mil</i> <i>lbs</i>	<i>lbs</i>	<i>mil</i> <i>lbs</i>	<i>lbs</i>	<i>mil</i> <i>lbs</i>	<i>lbs</i>	<i>mil</i> <i>lbs</i>	<i>lbs</i>	<i>mil</i> <i>lbs</i>	<i>lbs</i>
1963	1,281	6.9	1,190	6.4	1,785	9.6	2,525	13.5	2,450	13.2	8,639	46.3	4,780	25.6	14,030	71.9
1964	1,297	6.9	1,193	6.3	1,835	9.7	2,598	13.7	2,677	14.4	8,994	47.6	4,983	26.3	14,583	73.9
1965	1,232	6.4	1,225	6.4	1,891	9.9	2,695	14.1	2,711	14.1	9,147	47.8	4,816	25.1	14,571	72.9
1966	1,099	5.7	1,071	5.5	2,038	10.5	3,079	15.9	2,929	15.1	9,615	49.7	5,329	27.6	15,253	77.5
1967	1,076	5.5	1,055	5.4	2,046	10.5	3,108	15.9	2,956	15.2	9,634	49.4	5,234	26.8	15,475	76.2
1968	1,117	5.7	1,106	5.6	2,130	10.8	3,211	16.3	3,153	16.0	10,082	51.2	5,245	26.6	15,962	77.8
1969	1,081	5.4	1,011	5.1	2,154	10.8	3,398	17.1	3,333	16.8	10,333	51.9	5,410	27.2	16,390	79.1
1970	1,061	5.3	939	4.7	2,223	11.0	3,496	17.3	3,605	17.9	10,681	53.0	5,089	25.2	16,414	78.2
1971	1,039	5.1	880	4.3	2,264	11.1	3,429	16.8	3,695	18.0	10,650	52.2	5,049	24.7	16,356	76.9
1972	1,017	4.9	787	3.8	2,338	11.3	3,650	17.7	4,084	19.8	11,204	54.3	5,252	25.4	17,128	79.7
1973	1,000	4.8	705	3.4	2,350	11.3	3,593	17.3	4,312	20.8	11,296	54.3	5,106	24.5	17,067	78.8
1974	955	4.6	681	3.2	2,370	11.3	3,571	17.0	4,258	20.3	11,163	53.2	5,397	25.7	17,232	79.0
1975	1,012	4.8	632	3.0	2,375	11.2	3,661	17.3	4,275	20.3	11,297	53.4	4,965	23.5	16,937	76.9
1976	935	4.4	568	2.7	2,595	12.2	3,859	18.1	3,966	22.0	11,923	56.0	5,672	26.6	17,595	82.6
1977	937	4.3	495	2.3	2,508	11.6	3,796	17.5	3,958	21.6	11,694	54.0	5,953	27.5	17,647	81.4
1978	963	4.5	482	2.2	2,494	11.4	3,961	18.2	4,571	22.6	12,179	55.6	6,426	29.4	18,605	85.0
1979	1,009	4.5	564	2.3	2,524	11.5	4,144	18.9	4,890	23.4	12,618	57.7	6,160	28.2	18,778	85.9

<sup>1</sup> Including only the fat content of butter, estimated at 80.5 percent of total weight, and of margarine for which the fat content varies slightly each year.

<sup>2</sup> Actual weight.

<sup>3</sup> Mainly salad and cooking oils. Includes all food fats and oils used other than butter, lard, margarine, or shortening.

<sup>4</sup> Including actual weight of butter and margarine.

**Table 31—Margarine: Fats and oils used in manufacture, United States 1965-1979**

Year	Vegetable oils							Animal fats and oils		Total
	Soybean oil	Cottonseed oil	Peanut oil	Corn oil	Coconut oil	Safflower oil	Other	Lard	Beef fats	
	<i>Million pounds</i>									
1965	1,112	114	4	161	5	10	14	100	14	1,535
1966	1,294	106	6	157	12	46	1	82	5	1,710
1967	1,249	78	5	176	15	42	4	125	10	1,708
1968	1,240	70	4	179	14	42	3	153	15	1,720
1969	1,332	76	3	172	15	44	3	86	13	1,744
1970	1,410	68	—	185	10	22	1	90	8	1,794
1971	1,385	63	—	186	7	19	2	159	10	1,831
1972	1,461	65	—	194	6	20	2	128	10	1,886
1973	1,491	63	—	213	4	32	8	72	8	1,891
1974	1,457	58	—	188	9	16	9	160	7	1,904
1975	1,568	46	1	188	20	7	38	45	7	1,920
1976	1,671	51	38	218	4	10	58	37	7	2,094
1977	1,584	44	15	243	5	8	48	73	7	2,027
1978	1,593	42	—	211	7	10	27	77	6	1,973
1979 <sup>1</sup>	1,643	25	—	222	4	5	12	76	10	1,997

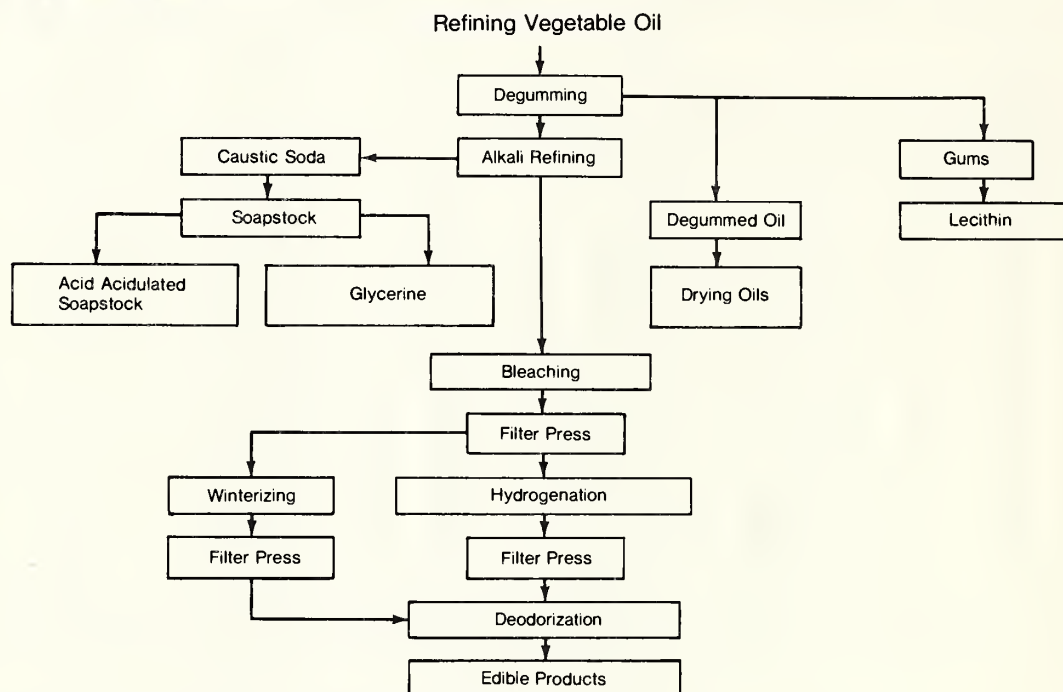
<sup>1</sup> Preliminary.

— N/A

*Economics, Statistics, and Cooperatives Service—Economics. Compiled from reports of the U.S. Department of Commerce. Totals computed from unrounded numbers.*



Figure 10

**Vegetable Oil Refining Process**

Source: U.S. Edible Fats and Oils Refining Capacities, 1975. ERS FOS-281, USDA.

**Table 32—Shortening: fats and oils used in manufacture, United States, 1965-1979**

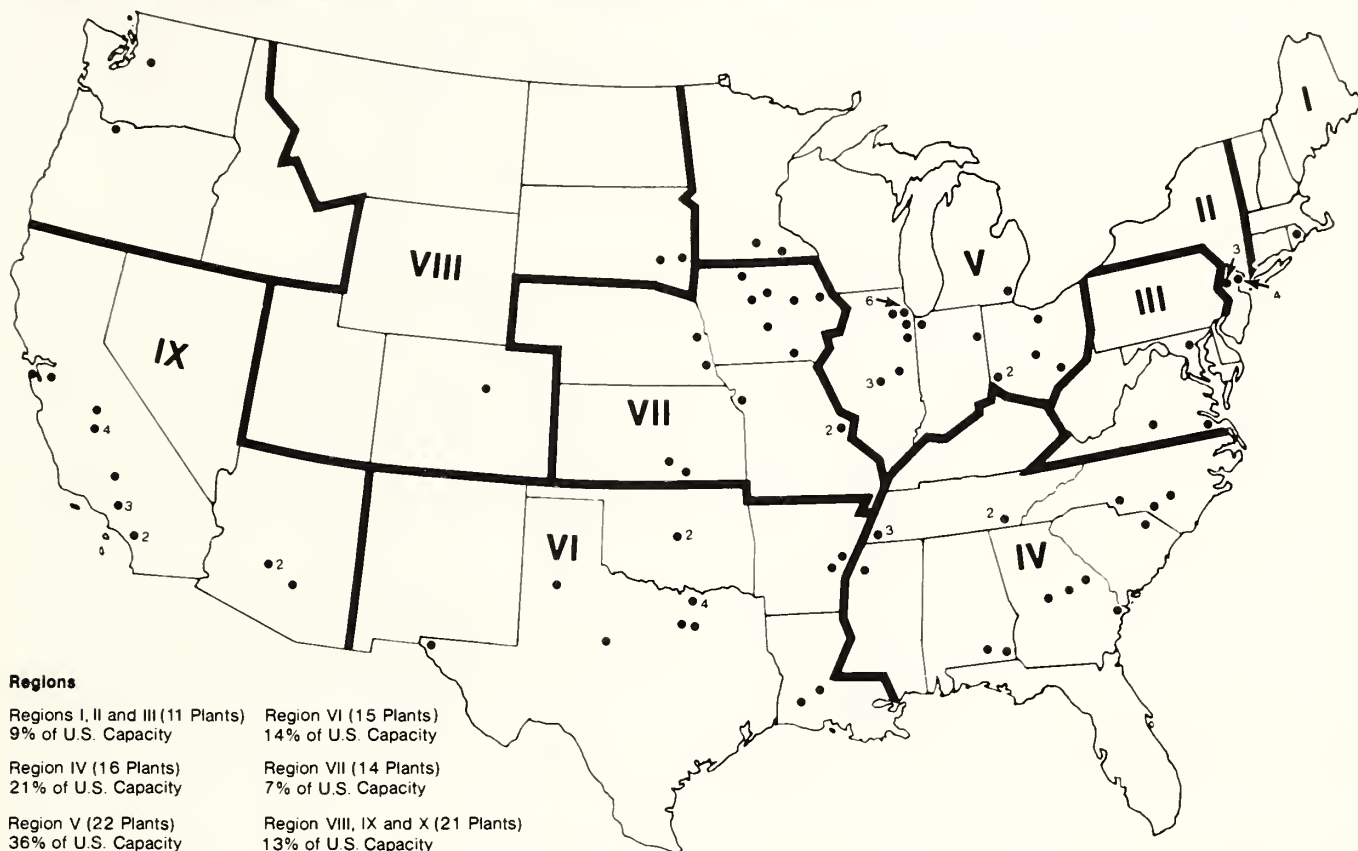
Year	Vegetable oils							Animal fats		Total primary and secondary fats and oils
	Cottonseed oil	Soybean oil	Coconut oil	Peanut oil	Corn oil	Palm oil	Other	Lard	Beef fats	
	<i>Million pounds</i>									
1965	403	1,471	20	3	8	13	6	456	388	2,768
1966	370	1,734	38	14	8	38	8	491	491	3,192
1967	273	1,741	40	24	12	61	10	576	506	3,243
1968	248	1,842	41	21	10	72	4	601	487	3,326
1969	248	2,101	47	16	13	110	13	475	483	3,505
1970	276	2,182	45	16	12	90	7	430	522	3,580
1971	168	2,047	56	15	5	171	11	520	517	3,510
1972	189	2,163	82	16	--	285	20	441	495	3,691
1973	199	2,268	86	16	5	333	29	341	442	3,719
1974	194	2,177	61	21	7	304	35	317	501	3,617
1975	154	2,025	106	11	5	758	69	165	458	3,751
1976	128	2,323	128	38	4	516	8	156	453	3,754
1977	160	2,279	78	22	4	416	9	185	548	3,700
1978	188	2,479	75	16	3	220	4	209	765	3,959
1979 <sup>1</sup>	168	2,680	93	13	6	222	3	319	713	4,217

<sup>1</sup> Preliminary.

Economics, Statistics, and Cooperatives Service. Compiled from reports of the U.S. Department of Commerce. Totals computed from unrounded numbers.

Figure 11

**Edible Fats and Oils Refining Plants, with Maximum Capacity by Region, 1975**



Source: U.S. Edible Fats and Oils Refining Capacities, 1975. ERS, FOS-281, USDA

Alkali plants varied considerably ranging from about 25 million pounds per year to 750 million pounds per year. Soybean plants providing all the crude oil input for these extremes would have 225 and 6,800 tons per day capacity, respectively.

The oil refining stages mark the point at which the makeup of the industry begins to change considerably. At previous levels, firms most able to handle large volumes of raw oilseeds play the dominant role. Beginning at the refining stage, dominant firms become those that have expanded out of their initial specialty; consumer product marketing.

At the oil refining stage the oilseed complex is entered by food firms including Unilever, Procter and Gamble, Hunt-Wesson Foods, and Kraftco, through its Humko subsidiary. Characteristics that distinguish these consumer product firms from the firms that assemble raw commodities and perform initial processing are their strong linkages to retail markets.

They are large, diversified into many industries (primarily consumer), involved in national brand name advertising and sales promotion, and committed to extensive product research and development programs.

Retail-oriented firms may integrate their businesses backward from consumer product manufacturing and retail sales, into ingredient processing and raw input procurement. Incentives for such backward integration include assurance of a steady supply of raw materials and ingredients, quality control, and capture of profits from areas related to the firms' expertise.

**Increasing Cooperative Refining Activity**

Cooperatives could strengthen their position in the U.S. and world oil markets by increasing their degumming and refining capacity. The ability to degum is necessary to directly participate in the export oil markets. Cooperatives that can

refine larger volumes of oil beyond the degumming stage will have greater control over their oil flow through the domestic oil complex.

Over 54 percent of the soybean oil sold by cooperatives is crude oil. While a portion of these crude oil sales is sold to cooperative refiners, most goes to noncooperative firms, leaving the cooperative system.

Increasing the amount of degummed oil they produce would give cooperatives greater flexibility and control in disposing of their oil. They could then seek higher marketing returns, selling more oil directly to foreign buyers rather than through U.S. exporters.

Eight cooperative solvent extraction processing plants degum or refine a significant part of their total oil production. Four refine significant quantities of their oil. The remaining eight solvent plants sell or transfer some of their crude oil to cooperative refiners. They sell most of it, however, to noncooperative refiners. Increasing their ability to degum and refine crude oil would improve these plants' marketing flexibility and extend the cooperative system's control over its oil flow.

Two strategies exist for increasing the quantities of oil cooperatives degum or refine. The first involves individual plants investing in the equipment necessary to refine the oil they produce. This of course, requires great expense for individual plants and may duplicate efforts by nearby plants.

Joint construction and ownership of a cooperative refinery is a second alternative for extending cooperative control over oil disposition. Such a refinery could handle the crude oil output of several plants. Costs, both capital and operating, would be distributed among owner processors. Returns could be distributed on the basis of patronage or capital contributions, depending on the form of organization established.

Table 33 shows that one potential area for locating a cooperative refinery is in the western Corn Belt. Oil production, by oil type, is shown for six cooperative plants there (western Iowa and western Missouri). None of the oil produced by the six plants is refined beyond degumming and only one-fourth is degummed. This compares to the 25 percent degummed oil and 32 percent refined oil output of the other cooperative plants. Indicated is the need for further refining by the western Corn Belt plants.

The relatively close proximity of the six plants indicates that a single, jointly-owned refining plant could be located to minimize the cost of transporting incoming crude oil and outgoing refined products. Direct access to transportation linking the refinery to all major markets is critical in selecting location. Constructing a refining facility at the site of an existing plant could decrease total capital requirements.

## Marketing of Vegetable Oil Products

Marketing of oil-based consumer or manufactured products may be directed at three basic buyer groups, each with their own characteristics. Products may be manufactured for sale to institutional or food manufacturing buyers. These buyers are attracted primarily by price and other terms of sale. Assurance of regular supply and quality meeting certain minimum standards is important to this type of buyer. Products are usually sold in bulk containers.

Private labelers are the second buyer group. They include small and medium-sized grocery chains and other retail operations which can not justify operating their own manufacturing plants. Private label buyers may also include wholesalers or distributors of food products who, in turn, sell to retailers. Products are usually packaged for consumers and labeled under the buyer's brand. The buyer assumes responsibility for promotion. Prices paid by these buyers are typically higher than those paid by institutional and industrial buyers because of the packaging service provided.

**Table 33—Oil production by type, volume, and percent for six western Corn Belt cooperative soybean plants<sup>1</sup> and remaining cooperative solvent plants, 1977-1979**

Plant group/year	Total oil production	Crude oil	Degummed oil <sup>2</sup>	Refined and hydrogenated oil
<i>Million pounds</i>				
Western Corn Belt:				
1977	754.2	569.4	184.8	0
1978	842.6	632.0	210.6	0
1979	848.9	637.7	211.2	0
Other co-op plants:				
1977	1,438.9	619.3	365.6	454.0
1978	1,546.8	677.4	362.9	506.6
1979	1,525.8	651.8	389.6	484.4
All co-op plants:				
1977	2,193.1	1,188.7	550.4	454.0
1978	2,389.4	1,309.4	573.5	506.6
1979	2,374.7	1,289.5	600.8	484.4
<i>Percent</i>				
Western Corn Belt:				
1977	100.0	75.5	24.5	0
1978	100.0	75.0	25.0	0
1979	100.0	75.1	24.9	0
Other co-op plants:				
1977	100.0	43.0	25.4	31.6
1978	100.0	43.8	23.5	32.7
1979	100.0	42.7	25.5	31.8
All co-op plants:				
1977	100.0	54.2	25.1	20.7
1978	100.0	54.8	24.0	21.2
1979	100.0	54.3	25.3	20.4

<sup>1</sup> Includes plants in western Iowa and western Missouri.

<sup>2</sup> Includes lecithin and byproducts.



The third group of buyers are those distributors and retailers wishing to purchase brand name oilseed products. Manufacturers of brand name products usually receive the highest prices for their products. Promotion is frequently the product manufacturer's responsibility, and may, in fact, be a condition for putting the branded products on store shelves, since buyers want to maximize sales volumes of their shelf space.

Brand name product buyers may operate locally, regionally, or nationally. National buyers may handle specific brand name products only in certain regions.

Consumer product sales require a different type of sales organization than for marketing large volume raw commodities or processed ingredients. Competitive public commodity markets are replaced by direct sales and promotional efforts. Sales representatives must personally and repeatedly contact buyers to secure and maintain customers. Costly sales operations must be established, however they become relatively cheaper as more products are made available to buyers. Buyers usually prefer to deal with sales representatives and firms which are able to offer a wide number of products rather than single items.

Most vegetable oil consumer products have very similar characteristics. Consumers normally have difficulty differentiating between various brands, thus firms must create name brand recognition and loyalty. Heavy advertising must be used to establish customer recognition.

A long-term advertising program is needed to establish eventual brand loyalty. An advertising program is costly and of very high risk. If the advertising campaign fails, no salable assets remain. A 1975 Census of Manufacturers survey showed that the nine national margarine brands spent an average \$3.3 million on advertising that year. Average advertising expenditure on the five major oil and shortening brand names was \$4.4 million. Advertising costs have approximately doubled since that time.

### **Manufacturing and Marketing of Meal Products**

Meal takes separate routes toward animal and human final edible products. Diverse technologies of different levels of complexity are involved. The more complex processes usually require more capital.

Animal feed is manufactured primarily through a blending and pelleting process. Plant scales run from quite small, less than 25 tons per day, to large, over 500 tons per day. Most animal feed plants are too small to handle the meal output of an average soybean processing plant. Feed is usually sold in bulk or bagged in a relatively simple process. Oilseed meal used in animal feed usually requires little if any further processing.

Since feed manufacturing involves both bulky inputs and outputs, location is concentrated as near as possible to both the sources of raw commodity inputs and animal production regions. Such desirable locations may be found frequently in the Lake States and Corn Belt. In regions feeding animals but lacking many feed ingredients, soybean meal and corn have to be brought in from other areas.

The bulk commodity characteristics of feed manufacturing naturally tie it into the farm commodity procurement and distribution system of a grain company or cooperative. Thus it is not surprising to find many major grain and oilseed firms, both cooperative and noncooperative, integrated into feed manufacturing. Almost all of the major soybean processing firms are also involved in the feed industry.

Animal feeds produced by different companies are fairly homogeneous with low margins, as is typical of a dispersed bulk volume industry with small plant sizes. Economies of scale may be almost entirely captured at the local or regional level, ruling out the need for national presence.

This similarity of products requires promotional and sales efforts. Much animal feed is sold on a brand name basis. Advertising through local media, trade magazines, and billboards supplements efforts made by feed sales representatives. The most successful feed companies have usually been multi-plant and oriented toward aggressive marketing to animal producers. Travel costs for feed sales representatives have increased considerably, however. Thus advertising and promotion may become increasingly important sales tools.

Oilseed meal products manufactured for human food must generally go through a more complex series of production processes than animal feeds. Raw meal must be extensively prepared prior to its use in the manufacture of human foods. Oilseed protein products, either flour, grits, or isolates are inputs in the production of edible consumer products. Firms preparing meal-protein forms for human food must either sell their outputs to food processors, or become food processors and marketers as well. Little direct promotion is done for oilseed protein edible products. Production of edible protein products should be located near major consuming areas to provide good access to most food processing facilities.

### **Cooperative Brand Name Oilseed Products**

Cooperatives have made inroads into brand name consumer product marketing. Riceland Foods markets its Chef-Way brand of shortening and cooking oil on a regional basis and dominates some significant local trade areas. Regional advertising is aimed at consumers. Marketing to retail outlets is usually on a direct basis.

Land O'Lakes manufactures and markets margarine under a number of brand names. The cooperative's primary brand



name and the primary advertising effort is Land O'Lakes margarine. Land O'Lakes has maintained a large national advertising campaign to improve consumer recognition and loyalty to the Land O'Lakes name. The cooperative has differentiated its margarine from all others by product characteristics as well as advertising. Including 10 percent nonfat milk in Land O'Lakes margarine gives it a unique, marketable quality.

On the protein side, cooperative product manufacturing and retail marketing has been primarily in animal feed, though some effort has been made in the edible protein areas. Farmland Industries produces Ultra-Soy textured vegetable protein and markets it primarily to food manufacturers. Land O'Lakes has limited experience in soy isolate manufacturing.

Five oilseed processing cooperatives have their own feed brands — Farmland's Co-op brand, MFA brand, Goldkist brand, Land O'Lakes' Felco brand, and GTA brand. Cooperative brand name feed is marketed primarily through cooperative facilities. Media advertising is directed at producers and persons in the feed industry.

These cooperatives' efforts in selling their brand name oilseed products are helped by their sales efforts for non-oilseed consumer products. The ability of cooperative sales representatives to compete for buyer time and shelf space will improve as more cooperative consumer products are introduced.

### **Retail Product Quality Assurance Association**

Oilseed cooperatives have an option other than private and brand name labling for marketing their consumer products—they can establish a cooperative retail product quality assurance association. Many cooperatives want the high returns from selling consumer products. They recognize that a successful brand name entry will bring higher returns than performing strictly private label services. However, establishing a brand name is an expensive and high risk proposition that leaves the unsuccessful firm with no salvageable assets to show for its investment. Thus many cooperatives are justifiably reluctant to undertake developing a brand name product.

Oilseed cooperatives could join all other cooperatives producing consumer products to form an association to advertise the generic cooperative product in consumer markets, to test product quality, and to develop a common symbol to be displayed on all cooperatively produced consumer products. Given proper promotion, the symbol would assure consumers that the product is a result high quality inputs and strict production standards.

The label could be attached both to brand name cooperative products and to private label products sold by firms willing to recognize its value. Thus, by pooling financial investment and risk, many cooperatives could capture a portion of the brand name price premium.

### **The Export Markets for U.S. Oilseeds**

Since World War II, the U.S. has shifted from being a major importer of fats and oils to become the predominant exporter. This resulted from the combination of a rapid growth in demand for soybean meal by the feed compounding industries of Western Europe and Japan and the United States' ability to produce soybeans. Soybean oil has emerged as a substitute for many of the world's traditional oils.

U.S. exports of oilseeds, vegetable oil, and meal products were \$8.9 billion in 1979, while total agricultural exports were about \$34.7 billion. The oilseed complex represents a significant net surplus for the U.S. trade balance with only about \$1 billion of imported oilseeds and products in 1979. Soybean exports account for more than half of the total value of all oilseed and oilseed products exported (table 34).

The importance of foreign markets to U.S. oilseeds is indicated by the percentages that move into export channels (table 35). The highest percentages are for sunflowerseed which reached 86 percent of total production in 1976 and averaged about 58 percent during 1974-79. The average percentage of sunflowerseed exports would have been higher except for a trimmers strike at Lake Superior ports in 1979. From 1973-79, soybean exports were about 38 percent of production and combined with soybean oil and meal sales, about 50 percent of production was exported. About 20 percent of peanut oil has been exported in recent years. Cottonseed moves into export channels primarily in the form of once-refined oil, averaging about 44 percent of total production.

Domestic demand for vegetable oils is more than filled by domestic oil production, thus oil export markets are very important. Participants at all levels of the U.S. oilseed complex are having to take an increasingly international outlook in the production, processing, and conditioning processes. The characteristics of demand for oilseeds and oilseed products vary among foreign markets in terms of quantities, types of oilseed, and mix of raw or processed products.

Cooperatives originated between 20 to 35 percent of the oilseed commodities exported over the past decade and participated to a lesser extent in direct export sales. The projected expansion in foreign demand and growing internationalization of the oilseeds and products trade is prompting some cooperatives to consider expanding their involvement in exporting.

## Global Demand for Oilseeds

The demand for oilseeds exhibits two distinct patterns in response to changes in population and income. Potential growth in demand for oilseed proteins is largest in high per capita income markets while the demand for edible fats and oils expand more rapidly in markets where per capita income is rising from relatively low levels. Annual U.S. per capita consumption of visible fats rose from 34 pounds at the beginning of this century to average about 54 pounds during the last decade. Per capita consumption of fats in many of the lower income countries of Asia and Africa is currently about 14 pounds. Vegetable protein is extensively used for livestock feeding in the highly industrialized countries of the world. The less developed countries have lower per capita consumption of meat and dairy products, and use little vegetable protein in feed for their relatively small livestock production sectors.

Population growth rates differ substantially between the more economically developed and less developed regions of the world. Presently the annual growth rates are about 0.7 percent in highly industrialized countries and 2.1 percent in

the less developed countries. Rates are not expected to decline substantially during the next two decades. The higher growth rate in the less developed countries has the biggest impact on total population and its geographic distribution, because they represent about 3.4 billion of the world's 4.6 billion population. By the year 2000, population is projected to reach 1.4 billion in the developed and 5.4 billion in the less developed countries. If the latter's current low levels of per capita consumption remain constant, their annual demand for edible fats and oils will increase about 14 million tons by the end of the century simply because of the population increase alone.

High population growth is one of the main constraints to the economic development of the less developed countries. It has a depressing effect on trade expansion. It can also lead to famine in the event of crop production failures. Under these conditions edible oils could be critical in relief efforts. Hungry people experience a stronger physiological need for consuming fats than starch. As of September 1979, the United States had contributed about 4.7 million tons of soybean oil and 0.8 million tons of cottonseed oil in 24 years of the Title I, PL-480 program.

Table 34—Selected oilseeds, vegetable oils, and oilseed cakes and meals: value of U.S. exports, annual 1973-1979

	1973	1974	1975	1976	1977	1978	1979 <sup>1</sup>
	----- 1,000 dollars -----						
<b>Oilseeds</b>							
Soybeans <sup>2</sup>	2,762,208	3,537,438	2,865,248	3,315,450	4,393,199	5,208,066	5,700,969
Cottonseed	3,015	9,524	2,210	13,790	5,304	14,586	4,133
Peanuts <sup>3</sup>	84,163	155,454	152,872	93,633	216,372	283,646	278,574
Flaxseed	2,577	1,704	7,315	2,551	5,198	495	718
Oilseeds, NSC <sup>4</sup>	43,699	347	1,477	500	1,253	6,074	7,730
Sunflowerseed <sup>5</sup>		71,621	65,134	114,069	152,540	343,641	379,992
Safflowerseed	9,233	7,774	21,466	2,133	8,040	12,723	14,516
<b>Oils</b>							
Soybean <sup>5</sup>	151,414	521,832	268,857	240,059	443,210	569,109	765,604
Cottonseed	85,991	173,597	197,580	128,189	197,112	196,976	192,878
Peanut	19,862	16,160	12,894	49,200	37,358	38,339	4,509
Coconut	2,083	1,515	1,279	7,944	3,742	3,269	4,486
Linseed	28,333	48,886	32,084	4,612	6,189	11,018	7,021
Corn	5,741	27,418	22,920	27,008	29,021	42,329	58,023
Sunflowerseed <sup>6</sup>	6,374	7,369	7,558	26,999	9,058	27,090	19,703
<b>Cakes and meals</b>							
Soybean <sup>7</sup>	932,962	943,786	638,726	864,347	919,894 <sup>8</sup>	1,241,970	1,416,457
Linseed	21,282	15,681	15,715	16,236	12,599	23,077	26,825
Cottonseed	6,436	6,741	1,528	4,594	9,774	17,161	24,515
Other cakes and meals <sup>7</sup>	19,365	31,446	15,875	13,403	10,217	17,006	10,083
Vegetable proteins <sup>9</sup>		5,474	7,779	19,543	24,975	38,634	52,036
<b>Total</b>	<b>4,184,738</b>	<b>5,583,767</b>	<b>4,338,517</b>	<b>4,944,260</b>	<b>6,485,055</b>	<b>8,095,209</b>	<b>8,968,772</b>

<sup>1</sup> Preliminary. <sup>2</sup> Beginning in 1978, excludes soybeans for planting. <sup>3</sup> Includes shelled and unshelled peanuts converted to shelled basis: 75% unshelled wt. = shelled wt. Beginning in 1978, includes confectionery peanuts. <sup>4</sup> Not separately classified. <sup>5</sup> Beginning in 1978, excludes partially hydrogenated soybean. <sup>6</sup> Prior to 1978, may include small quantities of olive, rape, colza or mustard seed oil. <sup>7</sup> Beginning in 1978, includes soybean flour and meal, non-defatted previously elsewhere classified. <sup>8</sup> Subject to revisions. <sup>9</sup> Includes isolates, concentrates; hydrolysates; textured or spun protein products.

Source: U.S. Department of Commerce.

The demand for oilseed protein has expanded more rapidly than that for vegetable oil during the past 20 years. This trend is demonstrated by the fact that the oilseed with the highest protein content, the soybean, has also become the leading oil-bearing commodity. Soybeans accounted for 24.3 percent of the world's supply of vegetable oil in 1979, up from 15.3 percent in 1969. The higher income regions of the world—Western Europe, the United States, and Japan—are expected to continue being the predominant consumers of oilseed meals. Given the continued fats and oils saturation in these developed markets, less developed countries will become increasingly important market outlets, commercially as well as aid recipients.

A key factor in international commerce is the value of currencies between trading countries and the level of foreign exchange reserves held by importing countries. The Bretton-Woods system of fixed exchange rates that prevailed until 1973 constrained U.S. exports. Under a floating rate system, several European currencies and the Japanese yen have appreciated in relation to the dollar during the seventies, having thus lowered the cost of U.S. products. During this period U.S. agricultural exports expanded dramatically.

Because of various trade restrictions not all U.S. agricultural commodities benefited from dollar devaluations in the European Economic Community (EEC). Price relationships between U.S. and European grains are maintained by the EEC's variable import levy as U.S. prices or the value of the dollar changes.

A particular raw oilseed or an oilseed product may become involved in import or export tax programs or subject to tariffs under various trading stances of individual countries. This generally raises prices of the restricted commodity to the importing country. Higher prices encourage increased use of substitute oilseeds and oilseed products.

The flow of oilseeds and oilseed products into the EEC is greatly affected by the EEC's import tax program. A 10 percent ad valorem import tax is levied on imported crude vegetable oil. A 15 percent ad valorem tax is levied on refined vegetable oil. These import taxes greatly favor the import of unprocessed oilseeds, to the advantage of the EEC processing industry. Oilseeds and meal are imported duty-free however, making oilseed protein cost less relative to feedgrain protein to European feed compounders when the value of the dollar is low relative to European currencies. Higher prices encourage increased use of substitute oilseeds and oilseed products.

Table 35—Major U.S. oilseed and products exports, 1973-1979

	Soybeans			Sunflowerseed		Cottonseed			Peanut Oil
	Seed	Oil	Meal	Seed	Oil	Seed	Oil	Meal	
<hr/> <i>1,000 metric tons</i> <hr/>									
1973									
Volume	13,221	439	4,415	<sup>1</sup>	21	12	248	39	47
% of production	.31	.06	.14	<sup>1</sup>	.18	<sup>2</sup>	.34	.02	.32
1974									
Volume	13,940	762	4,910	185	9	44	277	45	21
% of production	.41	.14	.20	.68	.10	.01	.42	.03	.13
1975									
Volume	12,496	356	3,783	210	9	7	298	14	12
% of production	.30	.05	.12	.39	.05	<sup>2</sup>	.63	.01	.07
1976									
Volume	15,332	510	4,862	399	46	65	236	29	48
% of production	.44	.09	.19	.86	.29	.02	.39	.02	.30
1977									
Volume	16,195	774	4,134	622	16	15	332	52	45
% of production	.35	.10	.12	.47	.04	<sup>2</sup>	.41	.03	.28
1978									
Volume	20,705	929	5,961	1,317	44	43	331	108	40
% of production	.42	.11	.16	.72	.07	.01	.53	.08	.23
1979									
Volume	20,888	1,129	6,087	1,326	30	7	287	163	5
% of production	.41	.11	.13	.38	.03	<sup>2</sup>	.34	.09	.03
1973-79 Average	.38	.09	.15	.58	.11	<sup>2</sup>	.44	.04	.19

<sup>1</sup> Not separately classified.

<sup>2</sup> Less than 1 percent.

Source: U.S. Department of Commerce.



Countries in the noncommunist world have established, under the guidance of the International Monetary Fund, various exchange rate mechanisms. Several lesser developed countries with deficit trade balances have pegged the value of their currencies to more stable ones. Many currencies are fixed to the dollar, including those of several major vegetable oil importers. The shortage of dollars and other hard currencies, not the exchange rate, restricts importing by these countries. Many governments ration their use of foreign exchange by restricting imports. When experiencing shortages of edible oils, they become dependent upon securing concessional credit terms or donations. During periods when some less developed countries improved their foreign exchange reserves and became able to relax import restrictions, vegetable oil imports rose substantially.

### Global Oilseed Processing

Oilseed processing plants are located in both consuming and producing regions of the world. Several West European countries and Japan have substantial crushing capacity. About 42 percent of global soybean crushing capacity is located in importing countries (table 36).

**Table 36—Global soybean annual crushing capacities of major markets, 1979**

Major markets	Soybean crushing capacities	
	1,000 metric tons	Percent
<b>Soybean Importing Countries</b>		
Belgium and Luxembourg	1,110	
Denmark	600	
France	3,490	
Italy	1,680	
Netherlands	3,000	
United Kingdom	1,400	
West Germany	4,300	
Spain	3,375	
Poland	840	
Yugoslavia	300	
Soviet Union	2,500	
Japan	7,150	
Korea, Rep. of	555	
China, PRC	5,000	
Taiwan	1,440	
Mexico	1,980	
Subtotal	38,720	42
<b>Soybean Exporting Countries</b>		
United States	35,455	
Brazil	15,000	
Argentina	4,000	
Subtotal	54,455	58
Total	93,175	100

Source: U.S. Department of Agriculture, Economics, Statistics, and Cooperative Service.

The growth of the crushing industry in consuming countries reflects the importance of oilseeds in international trade. The importance of adequate but not excessive processing capacity should be viewed in a global context. The global oilseed crushing industry experienced a period of excess capacity during most of the seventies until about 1978 when oilseed supplies began to grow rapidly. Global supplies grew from 53.3 million tons in 1976-77 to 89.6 million tons in 1979-80.

As the major supplier of raw commodities, the United States has served a critical role for the crushing industries of consuming countries. During the early seventies the United States accounted for about 65 percent of world trade in oilseeds. U.S. share was over 70 percent in both 1978 and 1979. Soybeans and sunflowerseeds are the primary raw U.S. oilseed commodities moving into export channels.

The U.S. role as a global raw oilseed supplier has been strengthened by some producing countries' policies that favor domestic processing and exporting of products. Oilseed crushing may be accomplished with relatively low level technology. For countries with small industrial bases and substantial domestic supplies of raw materials, forward integration to processing can stimulate economic development.

### World Oilseed Trade Flows

U.S. oilseeds and products are exported to every region of the world and almost every country. The trade flow data in tables 37 and 38 show U.S. export destinations of soybeans and sunflowerseed. Exports of soybean meal and various oils to major countries and regions are shown in appendix tables 6 through 8. The United States dominates several world oilseed and product markets.

**Soybeans** U.S. exports of raw soybeans move primarily to the markets with large crushing capacities, such as the northern countries of Western Europe. However, shipments are larger than would be expected based on crushing capacity due to a substantial volume of transshipments and re-exports to other regions from ports in northern West European countries. For example, based on a 5-year average for 1974 through 1978 of U.S. soybean exports to the Netherlands, 40 percent was consumed, 57 percent was transshipped and 3 percent was re-exported. The imports from the U.S. as reported in table 37 include transshipments. An estimated 64 percent of the Netherlands' transshipments and re-exports are forwarded to West Germany. An average of 38 percent of annual U.S. exports to the Netherlands may be considered as exports to West Germany. Although Argentina, Brazil, and Paraguay also compete for the Western European market, the United States recently held an 82 percent share of soybean sales there. The U.S. share of soybean exports worldwide is about the same. This large share for the United States resulted, in part, from below average soybean harvests in South America during the late seventies.



The high volume of transshipments and re-exports indicates an important feature of the trade in the main ports of the Netherlands and West Germany: They are fluid terminal markets for soybeans. Shipments can be made to these markets without having to make forward sales on all or parts of a cargo. Alternatively, soybeans can be procured in these markets to cover an export contract. To operate effectively in these fluid markets requires a sophisticated, multi-market trading program.

**Table 37—U.S. soybean exports by region or country of destination, 1973-1979**

Destination	1973	1974	1975	1976	1977	1978	1979
	<i>1,000 metric tons</i>						
North & Central America	382	732	468	653	808	1,157	781
South America	96	110	80	58	51	180	169
West Europe:							
Germany, F.D.	1,666	1,943	1,170	1,383	1,506	1,556	1,263
Netherlands	2,222	2,515	2,706	3,434	3,390	4,484	4,235
Spain	862	1,295	1,177	1,221	1,206	1,640	1,774
Other	2,402	2,324	2,180	2,844	3,113	3,813	3,401
Subtotal	7,152	8,077	7,233	8,882	9,215	11,493	10,673
East Europe	175	127	137	276	234	528	717
U.S.S.R.	483	0	0	571	565	744	1,817
Africa	13	15	0	16	103	42	45
Asia							
Taiwan	601	492	912	695	671	1,070	1,101
Japan	3,193	2,759	2,767	3,069	3,410	3,855	3,707
Other	711	1,006	469	654	829	949	1,389
Subtotal	4,505	4,257	4,148	4,418	4,910	5,874	6,197
Australia & Oceania	26	29	0	32	15	1	13
Undetermined	389	594	431	425	295	685	475
Grand total	13,221	13,940	12,496	15,332	16,196	20,705	20,888

**Table 38—U.S. sunflowerseed exports by region or country of destination, 1974-1979**

Destination	1974	1975	1976	1977	1978	1979
	<i>1,000 metric tons</i>					
Western Europe						
Germany, F.D.	80	113	183	184	270	325
Netherlands	26	26	104	191	384	413
Italy	0	0	14	35	100	133
Portugal	36	29	44	89	122	148
Other	27	16	7	61	51	155
Subtotal	169	184	352	560	927	1,174
Canada	10	5	5	5	39	21
Mexico	1	1	0	21	319	1
Other	5	20	42	36	32	130
Grand total	185	210	399	622	1,317	1,326

The Soviet Union has become an important market for U.S. soybean exports in recent years. It has the potential to substantially increase world protein demand, given its population of 280 million and its other resources. In recent years the U.S.S.R. has attempted to increase livestock consumption and has imported large volumes of soybeans and meal. The embargo in early 1980 disrupted direct trade flows from the United States, but soybeans and meal exports to the U.S.S.R. from Europe and Argentina largely replaced those from the United States.

**Sunflowerseed** The United States became the leading sunflowerseed exporter during the seventies, recently accounting for about 80 percent of world trade. For many years the U.S.S.R. was the world's leading exporter but since the early seventies has attempted to expand domestic consumption of sunflowerseed products. The traditional markets for U.S.S.R. sunflowerseed were processing and margarine manufacturing firms in the northern countries of Western Europe (primarily Unilever). U.S. sunflowerseed is filling the gap created by the U.S.S.R.'s withdrawal from the export market. West Germany and the Netherlands account for over half of U.S. exports (table 38).

**Soybean Meal** Soybean meal accounts for over 70 percent of world trade in oilseed meals. Its global utilization is even higher with the substantial domestic production in the soybean importing countries. The United States exports over 40 percent of total world soybean meal supplies. Brazil is the U.S.'s major competitor, and together they control almost 80 percent of total soybean meal export volume.

Soybean meal exports exhibit a trade pattern similar to soybeans. The predominant flow is to Western Europe. Over 50 percent of U.S. soybean meal exports are to Western Europe. Exports to Eastern Europe account for about 20 percent of U.S. soybean meal exports (appendix table 6). Soybean meal is used primarily in animal feed, especially for poultry, which consumes about half of the world output. As in the United States, European countries have a large livestock population, particularly dairy cattle, swine, and increasing numbers of poultry. Table 39 shows the growth in poultry production in some of the major countries or regions between 1961 and 1979.

The impact of livestock and poultry populations on vegetable protein utilization in the EEC is more significant than in most regions of the world because of EEC's adoption of feed manufacturing methods from the United States. The protection given to EEC grain production has increased meal utilization by lowering the cost of soybean protein relative to grain protein sources. In addition, cheaper sources of carbohydrates in the form of manioc from Thailand and Indonesia are replacing EEC grains in livestock feed. The use of manioc, which contains less protein than grain, has further increased the demand for oilseed meals.

**Table 39—Poultry meat production in selected countries or areas, 1961, 1979**

Country/area	1961	1979
----- 1,000 tons -----		
United States	4,481	8,579
Europe	2,434	6,812
Japan	73	960
U.S.S.R.	748	2,000

Source: FAO Yearbooks

**Vegetable Oils** World supplies of fats and oils have more than doubled since the late fifties, while per capita consumption in the industrialized countries has grown by about 20 percent. The United States has gained more competitors in vegetable oil exporting. Some of the competition is from West European oilseed processors who import raw U.S. soybeans and sunflowerseed. In addition, several high oil-bearing commodities, such as palm kernel, greatly add to competition. During the seventies, Malaysia expanded its palm oil production to become a major exporter.

The lower per capita consumption of fats and oils in the less developed countries has made them outlets for U.S. soybean oil, both commercially and as foreign aid recipients. Appendix table 7 shows that most soybean oil moves to non-European regions, unlike the flow of soybeans and meal.

Historically, soybean oil has been traded at a discount to many other edible oils. Through price competition and improved refining technology, soybean oil is increasingly substituted for traditional fats and oils. Substantial segments of the world market, however, demand particular oils because of such characteristics as taste, color, and smoke point.

Although the United States has produced about four times as much soybean as cottonseed oil during the seventies, a comparison of appendix tables 7 and 8 shows that these two commodities have been exported to Europe in about the same volumes. In addition, cottonseed oil exports to Egypt are consistently greater than soybean oil exports to any single country.

## Cooperative Involvement in Oilseed Exporting

### Cooperative Export Flows

Raw oilseed export commodities handled by cooperatives consist principally of soybeans, cottonseed, peanuts, flaxseed, and sunflowerseed. As many as four organizational or transactional steps may be taken in the flow of oilseeds

through cooperative channels from producer to the export markets. They are: (1) Farm to local cooperative, (2) local cooperative to regional cooperative, (3) regional to interregional cooperative, and (4) interregional to the export market buyer (figure 3). Frequently certain cooperative organizational levels may be skipped. For example, oilseeds may move from producer to regional cooperative and then from the regional into export, requiring only two organizational steps.

Oilseed commodity movements may appear rather direct from the organizational standpoint; however, the physical movement may involve a greater number of facilities. The regional cooperative may receive oilseeds from its local facilities and move them to its regional inland facility and then to its export facility for loading aboard ship. The physical steps may be only from the local cooperative to the port facilities of the interregional. Further descriptions of the principal organizational and physical flows of oilseeds for export follow.

**Farm to Local Cooperative**—For soybeans, flaxseed, and sunflowerseed, the first receivers are the independent local cooperatives and regionally owned local units. Cottonseed from the local cooperative gin is generally sold by the producer or his gin to a cooperative oil mill, with very little being sold by cooperatives into export channels. Peanuts move from the farm to the local cooperative sheller which may be locally or regionally owned. The decision to move raw oilseeds into export channels is usually not made by the first receiver but by the second and subsequent buyers. An exception would be where oilseeds are received by a regional's local unit, and the regional moves them directly to export points.

**Local Cooperative to Regional Cooperative**—Oilseeds generally move from the local level to the regional cooperative level, and in the process may flow through more than one facility. The regional may arrange for the oilseeds to move directly from the local, where purchased, to an interregional export facility. Alternatively, they may go through subterminal or terminal elevators. In a few instances, local cooperatives sell through a broker to a foreign buyer and pay a fee for putting the commodity through a port facility.

**Regional to Interregional Cooperative**—The regional cooperative may sell and ship oilseeds for export through an interregional cooperative, such as Farmers Export Co., or the regional may use its own export facilities. If cooperative export facilities are fully scheduled, the regional or interregional may move some of the oilseed commodity through noncooperative export facilities on a toll basis, thereby maintaining control until delivery to the foreign buyer. Cottonseed, flaxseed, peanuts, and sunflowerseed do not move to interregionals for export. However, regionals do ship



peanuts and sunflowerseed to export markets on their own. Some peanuts move from a regional to Intrade, an international cooperative exporting company.

**Interregional to Export Market**—Two interregional grain cooperatives sell soybeans on the export markets, Farmers Export Co. and Mid-States Terminal. They obtain soybeans largely from member regionals and send them through two interregional export elevators. Sales are primarily on a freight on board basis, though increasingly sales are made on a cost and freight, or a cost, insurance, and freight basis.

Cooperatives at various levels may purchase oilseeds, particularly soybeans, from noncooperative firms to supplement volume from their members. Purchases from noncooperative firms may occasionally be necessary to fully utilize cooperative facilities.

### Level of Cooperative Involvement

Local cooperatives have handled an estimated 35 to 40 percent of total farm sales of soybeans over the past decade. Regional cooperative soybean volumes have represented 19 to 28 percent of farm sales during the same period (table 40). Regional cooperatives grew during the 1970's, both in terms of percent of farm sales and in absolute quantities. Regional cooperative soybean volume has been roughly 70 to 80 percent of that handled by local cooperatives. Most regional cooperative soybeans originate in local cooperative elevators.

Interregional cooperatives handled an increasing volume of soybeans during the 1970's. Interregional volumes of soybeans, as a percentage of regional volumes, have grown from roughly 25 percent in the early 1970's to over 40 percent in the late 1970's. Interregionals are quite dependent on regional cooperatives for their soybeans. In 1979, about 80 percent of the soybeans handled by interregional cooperatives came from member regionals; more recent trends indicate increased purchases from nonmembers.

Cooperatives have emerged as significant participants in the world oilseed markets over the past two decades. Their export activity is a natural outgrowth of their heavy involvement in grain and oilseed marketing at the local and regional levels. In 1979, cooperatives shipped 246.6 million bushels of soybeans into export channels, accounting for about 32 percent of the U.S. soybean export flow. Cooperatives directly exported between 10 and 15 percent and delivered about 2 percent to foreign ports.

Cooperative soybean shipments to cooperative-owned port elevators totaled 165.8 million bushels in 1979, up considerably from 1973 (93 million) and 1975 (65.8 million bushels). Cooperative shipments to cooperative port elevators represented 67.3 percent of total cooperative export shipments in 1979, not greatly changed from earlier in the 1970's (table 41).

**Table 40—Volume of soybeans handled by regional and interregional cooperatives and regional cooperative share of total farm soybean sales, 1972-1979 marketing years**

Year	Volume of Soybeans		Regional cooperative share of total farm sales
	Regionals	Interregionals	
	<i>Million bushels</i>		<i>Percent</i>
1972	257.7	75.3	22.3
1973	291.6	73.7	23.0
1974	294.2	80.4	19.3
1975	256.5	81.0	21.3
1976	260.6	117.3	23.6
1977	342.4	116.2	27.1
1978	405.3	164.4	25.0
1979	476.5	218.9	28.4

Source: U.S. Department of Agriculture, *Regional Grain Cooperatives 1978 and 1979 Research Report No. 3*, Agricultural Cooperative Service.

**Table 41—Soybean shipments to cooperative and noncooperative port elevators, 1973-1979**

Year	Soybean shipments to port			Shipments to cooperative elevators as a percent of total
	Total	To co-op elevators	To nonco-op elevators	
	<i>Million bushels</i>			<i>Percent</i>
1973	129.7	93.0	36.7	72.7
1975	105.7	65.8	39.9	62.3
1977	163.0	105.9	57.1	65.0
1979	246.6	165.8	80.8	67.3

Shipments of soybeans to port by regional cooperatives between 1973 and 1979 are shown in table 42. Regional cooperatives shipped 179.1 million bushels of soybeans to Gulf ports in 1979, representing 72.6 percent of cooperative port shipments. Regional cooperatives shipped 39.3 million bushels of soybeans to Atlantic ports in 1979, for 15.9 percent of cooperative port shipments. Port elevators on the Great Lakes received 28.2 million bushels of soybeans from regional cooperatives in 1979, or 11.4 percent of cooperative port shipments. The balance in shares of cooperative soybean shipments to port between the three port areas remained essentially unchanged in the 1970's, though varying considerably from year-to-year.

Regional cooperative soybean shipments to port locations as a percent of their total soybean sales are shown in table 43 for 1972 through 1979. During this period, total soybean sales by regional cooperatives rose by 103 percent from 257.7 million bushels in 1972 to 524.4 million bushels in 1979. Regional cooperative soybean shipments to port rose 178 percent, from 88.7 to 246.6 million bushels during this period. Shipments to port have become increasingly important to regional cooperative soybean operations.



**Table 42—Soybean shipments to ports by port area, by regional cooperatives, 1973-1979**

Year	Atlantic	Gulf	Port area Lakes	Pacific	Total
<i>Million bushels</i>					
1973	19.8	84.1	25.8	0	129.7
1975	7.7	86.4	11.6	0	105.7
1977	31.9	105.1	26.4	0	163.4
1979	39.3	179.1	28.2	0	246.6
<i>Percent</i>					
1973	15.3	64.8	19.9	0	100.0
1975	7.3	81.7	11.0	0	100.0
1977	19.5	64.3	16.2	0	100.0
1979	15.9	72.6	11.4	0	100.0

**Table 43—Percent of regional cooperatives' soybean sales shipped to port areas 1972-1979**

Year	Total soybean sales <sup>1</sup>	Soybeans shipped to port areas	Port shipments as Percent of total sales
<i>Million bushels</i>			<i>Percent</i>
1972	257.7	88.7	34.4
1973	291.6	129.7	44.5
1974	294.2	123.2	41.9
1975	256.5	105.7	41.2
1976	369.2	138.1	39.4
1977	354.3	163.4	46.4
1978	434.2	225.8	52.0
1979	524.4	246.6	47.0

<sup>1</sup> Net sales figure—removes double counting when regional sales are made to interregional cooperatives.

**Table 44—Cooperative port elevator capacities and share of total capacity, by port area, 1980**

Port area	Total elevator capacity	Cooperative elevator capacity	Cooperative share of total capacity
<i>1,000 bushels</i>			<i>Percent</i>
Atlantic	43,933	9,250	21.1
Gulf	123,265	24,092	19.5
Great Lakes	143,036	34,700	24.3
Pacific	51,947	4,152	8.0
U.S. total	362,181	72,194	19.9

Table 44 shows port elevator capacities and cooperative elevator capacities for the four primary exporting areas for 1980. The Great Lakes and Gulf ports had the greatest share of elevator capacity with 143.0 and 123.3 million bushels, respectively. These represented 39.5 and 34.0 percent of the U.S. total.

Cooperative share of port elevator capacity ranged from a high of 24.3 percent at the Great Lakes to a low of 8.0 percent at the Pacific in 1980. Cooperatives controlled 21.1 and 19.5 percent of port area capacity for the Atlantic and Gulf areas, respectively.

Two interregional cooperatives operate port elevators in oilseed exporting areas, Farmers Export Co. and Mid-States Terminal. Several regional cooperatives operate port area elevators, including Farmers Union Grain Terminal Association, Agri-Industries, Inc., Indiana Farm Bureau Cooperative Association, Inc., Farm Bureau Services, Inc., Producers Grain Corp., Far-Mar-Co, and Union Equity Cooperative Exchange. Other regional cooperatives operate large river terminal elevators which may ship raw oilseeds to export ports; these include Riceland Foods, Far-Mar-Co, Growmark, Inc., Landmark, Inc., and MFA, Inc.

Some of the large cooperative oilseed processors export edible oil and meal. Meal exporting requires more foreign port delivered sales than soybeans or oil. About 35 percent of cooperative cake and meal exports are foreign port delivered. Cooperative exports of edible oils are primarily on an f.o.b. basis.

Two of the largest cooperative soybean processors and refiners, Gold Kist and Riceland Foods, are multiproduct organizations with their own international divisions to export meal and oil. Ranchers Cotton Oil in California is one of the largest cottonseed processors in the world, and because of its location, has been active in meal and oil exporting.

Soy-Cot Sales, Inc., and its processor members have been oriented toward domestic marketing; however, an increasing percent of their sales volume is going into export. Soy-Cot has historically provided more coordination for selling edible oils to the large domestic product manufacturing and packaging firms. Domestic sales of meal are frequently handled by individual members, but Soy-Cot has been active in finding outlets for excess meal in U.S. export port markets. Soy-Cot is leasing storage tanks in the port of New Orleans for soybean oil shipping and in Houston for cottonseed oil. Controlling storage tanks at the ports should involve Soy-Cot more in the export market.

Oilseed cooperatives have been expanding their world trade not only through the steady growth of their U.S. based operations—they have recently acquired an existing worldwide sales network. Three regional cooperatives with oilseed marketing programs—Gold Kist, Land O'Lakes, and Indiana Farm Bureau—along with several other U.S. regional, Canadian, and West European cooperatives have formed a jointly owned subsidiary, Intrade, and acquired a controlling share of stock in the Toepfer Co. of West Germany. Toepfer is a grain trading firm with worldwide sales offices and substantial presence in East European soybean meal and oil

markets. This investment substantially improves these cooperatives' ability to gather market intelligence and compete for sales in world markets.

### **Considerations for Expansion of Cooperative Exporting**

Commodity exporting involves transactions and shipping between at least three types of markets: Interior, origin ports, and foreign ports. A fourth type of market will be encountered if the exporter operates within the infrastructure of the feed and food system in the consuming country. Merchandising and shipping from interior points to port areas is often referred to as "delivered sales." Selling in the delivered market, while an essential part of the export system, is usually not considered to be export merchandising. Sellers in the delivered market include a large number of interior grain dealers, cooperatives, and oilseed processors. Exporters are generally those merchandising and shipping between origin ports and foreign destinations.

Participants in the export trade include integrated multinational firms, Japanese and other trading companies, procurement agents of consuming country governments, and cooperatives. Multinational firms usually operate as buyers and sellers at both ends of the system, in domestic markets and in some foreign markets.

Trading companies are of many types with different objectives. Japanese traders operate from a consumer orientation in procuring oilseed supplies for their processing industries at home. They are large operations with a diverse range of commodity activities. Trading companies also come in the form of firms that may not have processing and only limited storage facilities, but are able to merchandise in a relatively small but effective manner in the f.o.b. export markets. State traders are the major participants in the export business for many of the nonwestern European countries and less developed countries. They are almost exclusively involved as buyers in both the f.o.b. market and the foreign port delivered market.

U.S. cooperatives have considerable strength in originating, processing, and delivering oilseeds and oilseed products to port. They face some structural barriers to further growth of their export program. The first of these is the size and structure of individual cooperatives relative to their multinational competitors. The second is the lack of fully coordinated cooperative export effort in amassing large volumes for export, in marketing and shipping, in pooling market intelligence, and in risk management.

Involvement in the world edible oil market requires large scale operation and the ability to participate in the commercial or PL-480 tender markets. Tenders issued by government buyers are usually of large quantities—10,000 to 20,000 metric tons.

Many cooperatives would have difficulty making numerous sales of this magnitude as individual organizations.

Many state traders often lack a comprehensive procurement strategy for edible oils. Often countries do not adequately anticipate their buying needs because of their desire to achieve greater self-sufficiency in oilseed production. Due to their market intelligence networks, the multinationals are often better able to anticipate the level of a country's import requirements and prepare in advance for export sales.

Overseas involvement by multinationals enables them to develop markets for their products. Personal relationships with buyers in importing countries and international markets may be developed, thus more timely information may be acquired and better position for subsequent sales established.

Handling several commodities with multiple sources gives multinational firms the advantage of substituting between sources and commodities, and the ability to deal with a larger number and variety of buyers in the world markets. A greater variety of commodities and products may be offered the buyer who has yet to determine purchase specifications. The ability to ship from many ports, both domestic and overseas, insulates multi-national firms from disruptions which may occur periodically at individual ports. The multiple source advantage of multinational firms would not appear to be as great for oilseeds as for the grain trade, because of the dominance of world oilseed supply by U.S. producers.

Several multinationals began as soybean processors and protein manufacturers for livestock feed and human consumption. They expanded their operations worldwide on the basis of their expertise in oilseed processing and feed compounding. Some of them have interior and port elevators for shipping U.S. soybeans to their foreign plants. Firms such as Archer-Daniels Midland, Anderson Clayton, Central Soya, and Ralston Purina are in this category.

Other multinationals began primarily as grain traders. Firms in this group include; Cargill, Bunge, and Continental Grain. The most fully integrated and globally operated multinational firm in the oilseed complex is Cargill. Originally a grain export company, it expanded into soybean processing several decades ago. Cargill has developed worldwide edible oil operations, and is strong in the feed and livestock industries. Bunge is another grain multinational with extensive global soybean processing operations. Continental Grain has continued to emphasize its trading functions with less emphasis on its processing functions.

The multinationals' share of the world oilseed commodity trade is difficult to identify. Shares of soybean processing capacity somewhat indicate the structure of the world oilseed market. An estimated 70 percent of global soybean processing capacity is operated by multinationals. Brazil's policy of



encouraging domestic processing and foreign direct investment provided an opportunity for several multinationals to expand their operations. Bunge, Cargill, Continental, and Anderson Clayton have about 50 percent of Brazil's 15-million-ton capacity. However, Brazilian cooperatives have been encouraged by their government to expand in processing. They control a large share of the remaining capacity and are exporting soybean meal and oil.

The multinationals' share of processing capacity in the EEC is about 60 percent. About one-third of this, in the northern countries of the EEC, is controlled by Unilever, an Anglo-Dutch multinational. Unilever is involved with feed compounding, but is primarily a vegetable oil refiner and product manufacturer. Unlike the multinationals of U.S. origin, Unilever procures all of its soybeans in European markets. About 40 percent of processing in the EEC is operated by firms that are not multinational in scope.

Multinational exporters dominate in meal exporting because they can sell from their own processing plants either in the United States, another exporting country, or an importing country. They have offices in the major markets, and can serve the volume and schedule requirements of the feed compounders. Multinational ownership of facilities in foreign markets including elevators, processing plants, and feed mills gives them the total flexibility needed to direct the flow of oilseeds and oilseed products in the most rewarding manner.

Thus, cooperatives' competition in oilseed export marketing is dominant, multi-faceted, flexible, and has a long-term commitment to worldwide operation. These characteristics give multinational firms substantial advantages over U.S. cooperatives. Cooperatives have made progress in exporting oilseeds in spite of the advantages of multinational firms. Their strength in originating oilseeds has provided the base for this expansion. Many multinational firms have traditionally depended on the cooperative system for origination and delivery to river and port terminals, preferring to invest their capital in more lucrative marketing areas of the oilseeds and grain complexes.

In recent years many multinational firms have aggressively moved into origination in oilseed producing areas. While this movement has apparently come more at the expense of small private elevators, it will eventually lessen the multinational firms' dependence on the cooperative oilseed origination and delivery system. The expanded control by multinational firms over their own oilseed flows will require an equivalent expansion by cooperatives if they are to maintain their position and compete head-to-head. Cooperatives will have to move more of their members' oilseeds and oilseed products further toward final users. They may also have to change marketing techniques. These changes may include owning and operating facilities in foreign locations in addition to establishing sales and marketing offices there, giving

cooperatives the full flexibility presently enjoyed by multinationals.

### **Advantages and Risks for Cooperatives in Oilseed Exporting**

The steps taken by cooperatives to develop greater export capabilities reflect their willingness to prepare for and participate in the expanding U.S. oilseed export trade. Export trade offers cooperatives several advantages.

1. Each further level of export activity will provide the cooperative with a wider variety of buyers, improving the potential for higher prices and margins. Dependence on a particular port, buyer, or market will be diminished.
2. Selling directly to foreign buyers will extend producers' control over their commodities further along the marketing chain. Profits presently going to noncooperative firms may be obtained by members. Improving direct export capabilities may make possible U.S. cooperative-to-foreign cooperative trading arrangements.
3. Increased worldwide presence gives cooperatives better market intelligence. They will better understand each buyer's precise quantity and quality requirements. This knowledge would allow cooperatives to blend oilseeds and oilseed products to the buyer's exact specifications, improving the cooperatives' ability to compete on the basis of price.
4. Cooperatives have a long-established reputation for quality products among foreign buyers, some of whom are willing to pay premiums for assured quality. Cooperatives could benefit from this reputation. To make these quality assurances, cooperatives will need to control movement of their commodities closer toward the final destination. As soon as the commodities leave cooperative hands, their ability to control quality is greatly diminished. Cooperatives should not overemphasize selling the quality of their export commodities. Most world trade in oilseeds is oriented toward aggressive price competition with little reward for special quality characteristics.

Risks are also associated with cooperatives becoming more involved in export oilseed trade. These risks raise transaction costs by necessitating some degree of protection. Some risks may be managed through hedging or insurance, but not all. Some risks are not conceptually different than exist in domestic markets, yet involve broader, worldwide considerations. Risks involved in exporting oilseeds and oilseed products include the following:

1. **Commodity price fluctuations:** Flat price change risks may be hedged, but changes in the basis and spreads may not. The length of time between the initial sale of the commodity and its delivery for payment may be longer for export sales than domestic sales. Thus the period of exposure to changes in basis or spread is longer.



2. Transportation rate fluctuation: Inland and particularly ocean freight rates are quite volatile. An exporter that must seek and arrange shipping for occasional sales may be forced to accept a loss on a sale due to unfavorable changes in the spot market for river and ocean transportation. Ownership or long-term charter of vessels will dampen the variability in ocean freight costs for the exporter, but will increase capital costs and require commitment to a steady export program.

3. Exchange rate fluctuations: Changes in the exchange rate between the dollar and the involved currency of exchange may occur after the sales agreement was made, but prior to payment. Unless the exchange rate can be accurately hedged, changes may reduce or eliminate margins on a sale.

4. Delay risks: Delays in loading or unloading commodities, for whatever reason, make the responsible party subject to demurrage charges. Payments for demurrage can quickly wipe out any margins. Lengthy delay may cause quality deterioration resulting in price discounting or buyer rejection.

5. Buyer rejection: Shipments are frequently rejected by buyers for a variety of reasons—physical damage, quality disputes, or inability of the buyer to make payment. Rejection could force the exporter to make distressed sales or to ship to alternative destinations, greatly adding to costs. Some protection instruments are available such as insurance and letters of credit.

6. Government actions: Governments in the country of origin may unexpectedly apply trade restrictions against certain countries or to set export quotas. Governments in countries of destination can likewise make sudden decisions which affect imports. International unrest and strife may also disrupt trade.

These risks comprise a wide range of various problems and complicated situations that an exporter encounters. In general, the cooperative must decide how much risk exposure is tolerable, what level of financial loss is endurable, and what terms are acceptable to buyers, all with the ultimate objective of trying to maintain long run and repeat business.

### **The Need for Unified Cooperative Export Efforts**

No single U.S. oilseed cooperative can duplicate the worldwide oilseed network of many multinational firms. Some individual cooperatives may make substantial inroads into particular export activities and markets, given complete dedication of capital and investment to that end. However, creation of a fully flexible multimarket oilseed export system is beyond the financial capability of most cooperatives, especially in light of their necessary capital commitment to other areas of operation.

The benefits of intercooperative effort in exporting oilseeds have several examples. Farmers Export Co. showed how with strong backing a cooperative export organization can combine the origination and transportation capabilities of several cooperatives to achieve rapid growth and prominence in world grain and oilseed trade. The established and steady growth of Soy Cot Sales Inc., and its movement into the oil export markets by controlling oil tanks for export shipment of soybean and cottonseed oil demonstrates the potential for a more complete oil and meal export program. The formation of Intrade has demonstrated that the combined investment of cooperatives can create the intelligence and marketing network necessary for a worldwide oilseed trading program.

Each of these joint cooperative efforts into export markets has been successful thus far; however, as each attempts to expand its role in exporting, an increasing amount of overlap will occur. Each will eventually need overseas offices in all market areas, transportation specialists, export finance specialists, communications networks, and administrative services. Duplication of efforts in these areas will diminish the potential benefits of limited farmer capital.

The intercooperative export sales organizations could eliminate this potential duplication of effort and expense by consolidating their oilseed and oilseed product export programs. Consolidation would put together the parts already in place. In conjunction with the strong cooperative origination and transportation network, the resulting organization would extend farmer control of oilseed flows all the way through the final export destinations.

The unified cooperative oilseed export organization would have the advantage of shipping from all U.S. port areas and would thus be capable of serving all export markets. Responsibility for both raw oilseed and processed product sales would allow the organization to serve a particular market with whatever form of product is most rewarding at a given time. The organization could fulfill a wider variety of buyer needs.

The key ingredient for success in a single cooperative export organization would be support from member cooperatives in terms of capital and commodities. The organization would have to be assured of continued availability of large oilseed volumes to do an effective marketing job. The elimination of duplicated export efforts would partially contribute to this necessary commitment by member cooperatives.

Agreements to deliver oilseeds and products for sale by the cooperative export organization would be needed from regional and local cooperatives. While these agreements may be informal or formal, the commitment to support must be understood and fulfilled. Conditions under which the agreement may be changed should also be considered. Without volume commitments by member cooperatives, the

export organization would necessarily require some degree of control over domestic flows of oilseeds to insure its continued ability to enter into long and short-term sales agreements with foreign buyers.

The commitment by member cooperatives to support the export organization through capital would depend upon and be strengthened by competitive success of the organization. Member cooperatives would have to remain convinced that the highest long run returns to their own oilseeds operations and investments were available through the organization.

### **Challenges for Oilseed Cooperatives**

Several changes will continue to face cooperatives involved in the oilseeds complex. While some may be unique to cooperatives, many others affect a much broader segment of agriculture and the U.S. economy. These challenges include transportation, energy, growth, and the need for coordination to meet new competitive pressures.

#### **Rail Transportation**

Transportation, particularly rail transportation, is presently of concern among participants in the oilseeds complex. This reflects the problems and uncertainty of the future of the U.S. railroad industry including: (1) Line abandonment, (2) the shortage of railcars and slow car turnaround, (3) the effect of deregulation on rates and service, (4) the system of price differentials for various origins and differentials (as a result of the previous problems) and, (5) the optimal plant and facility locations relative to sources of supply and the final markets.

Rail line abandonment has become a nationwide problem as low volume or seasonal lines, particularly branch lines, generate too little revenue to maintain. Elevators located on abandoned lines will lose their competitive ability. Assembly of oilseeds and oilseed processing will necessarily become more concentrated on major North-South or East-West rail lines. Elevators on major lines will become larger to ship in unit-trains. More direct farm-to-terminal elevator movement is expected, bypassing local elevators.

The shortage of rail cars has affected all large volume shippers, making it extremely difficult to complete shipments in full compliance with terms of sales agreements. Many shippers have attempted to counter the shortage by leasing or buying their own cars. They have found it difficult, in many cases, to use the cars enough to break even due to poor car turnaround. Slow car turnaround is a fundamental problem of the U.S. rail system, a result of deteriorating roadbeds and congested, outdated rail yards.

Rail deregulation promises considerable change in rate structures and shipping arrangements. While the directions

and magnitudes of these changes are not certain, some effects seem clear. A facility capable of shipping large volumes, particularly large numbers of unit-trains, will have the greatest leverage in rate negotiations with railroads. Large multi-facility firms will likely have an advantage over large single-facility firms. The ability to use shipper-controlled cars and to provide backhaul arrangements will also give the shipper additional leverage.

The availability of in-transit arrangements and the relative freight rates for raw versus processed commodities will greatly affect the location of processing facilities. This will, in turn, affect the pattern of assembly facilities to feed raw oilseeds into the processing industry.

#### **Energy**

Rising energy costs and shortages affect every participant in the oilseeds complex. Costs and risks both rise with instability of prices and supplies. About the only way oilseed cooperatives can deal with continuing energy problems is to make their energy supplies as secure and their facilities efficient as possible.

In some cases, special opportunities for improving energy security are available to cooperatives. For example Boone Valley Cooperative Processing Association has purchased an old municipal power plant, and Farmland Industries' Sargeant Bluff soybean plant has built a direct steam pipeline to a nearby power plant. This type of energy supply arrangement is not available to most plants, however. All oilseed cooperatives must continue to support the various inter-cooperative energy efforts.

#### **Growth**

Continued growth may be expected in the oilseeds complex as world population and income grow. Cooperatives will have to grow accordingly to maintain their present position. This growth will require increasing amounts of capital. The accumulation of capital for expansion, even maintenance of position, is a difficult problem for all cooperatives. High interest rates and high debt levels will continue to require creative financial management.

Cooperative producer-owners should develop long-range plans for growth and achieving that growth. Satisfaction with the status quo will eventually diminish cooperative presence and decrease producers' ability to influence the oilseed complex through their cooperative organizations.

Oilseed cooperatives will have to decide where and how to expand their activities. Growth could be concentrated in a horizontal direction with emphasis on increasing market shares in major cooperative areas such as procurement and processing. A vertical approach could be taken, increasing



cooperative food manufacturing, distribution, and sales. Growth may be focused domestically to cultivate the cooperative role in the large and dependable U.S. markets. Alternatively growth in foreign markets could be pursued, including eventual direct foreign investment in plant and equipment. Simultaneous pursuit of all these growth paths will require a coordinated effort by oilseed cooperatives.

### Competitive Pressures and the Need for Coordination

Cooperatives in the oilseed complex will face increased competitive pressure in the future. This pressure will not arise so much from new participants as from a restructuring of the involvement by those firms presently active in the oilseed complex.

Cooperatives will be challenged more and more as they extend vertically into domestic consumer and foreign markets. In each successive vertical step forward, the competition will become more direct firm-versus-firm.

Perhaps more significantly, cooperatives will face competition from large firms at the level of cooperatives' greatest strength: The local market assembly points. Over the past few years, large domestic refiners, food processors, and multinational firms have been increasing their ability to originate oilseeds. This restructuring at the assembly level, while not directly affecting cooperative market shares, will affect the future role played by cooperatives at all subsequent vertical levels.

The increased ability of these firms, particularly the multinational firms, to originate oilseeds will decrease their dependence on cooperatives. This will diminish oilseed cooperatives' strength in relation to the multinationals. To compensate for this loss of strength at the assembly level, cooperatives must become less dependent on noncooperative firms to buy cooperative commodities at successive vertical levels. Increased intercooperative and interlevel coordination will be necessary if oilseed cooperatives are to obtain the highest possible returns from the raw oilseeds which they originate.

### Selected Oilseed References

1. American Soybean Association. *The Soybean Digest*, Blue Book Issue. St. Louis, Mo., annual issues.
2. Caldwell, B.E., et. al. *Soybeans: Improvement, Production and Uses*. American Society of Agronomy, Inc., Madison, Wis., 1973.
3. Campbell, G.R. and M.L. Hayenga, ed. "Vertical Organization and Coordination in Selected Commodity Subsectors." North Central Project 117, WP-20, 1978.
4. Cobia, David W., and D.E. Zimmer. "Sunflower Production and Marketing." N. Dak. Agri. Exp. Sta. Ext. Bul. 25, 1978.
5. Dronne, Yves. "Le Phenomene Multinational Dans le Secteur Des Proteines." Symposium of the European Association of Agricultural Economists, Saragossa, Spain, April 1980.
6. Experience, Inc. "Sunflower Processing: Factors in Domestic Competition." N. Dak. Dept. Agri. Contract 1202, 1979.
7. Fletcher, L.B. and D.L. Kramer. "The Soybean Processing Industry" from *Market Structure of the Agricultural Industries*, J.R. Moore and R.G. Walsh, ed. Iowa State University Press, 1966.
8. F.A.O. "Expanding Trade in Fats and Oils Among Developing Countries—Opportunities, Constraints, and Policy Needs." Comm. on Commodity Problems, 14th Session, Rome, 1980.
9. F.A.O. Yearbooks. Rome. Selected years.
10. Helgeson, D.L. et. al., "The Economic Feasibility of Establishing Oil Sunflower Plants in North Dakota." N.D. Exp. Sta. Bul. 503 N.D. St. U. Fargo, N.D.
11. International Association of Seed Crushers, *Proceedings of the IASC Congresses*. London, U.K., 1970-1979.
12. Kromer, G.W. and S.A. Gazelle, "U.S. Edible Fats and Oils Refining Capacities, 1975." U.S. Dept. Agri., ERS. F.O.S. 281, 1976.
13. Lamm, R. McFall. "Economies of Scale in Cottonseed Processing." Agri. Econ. Res. Vol 31:1 pp. 26-33. 1979.
14. Lamm, R.M. "Simulated Processing Costs and Rates of Return for Selected Vegetable Oil Products." Res. Div. bul. 108, VPI University, 1976.



15. Lamm, R.M. "Manufacturing Cooking Oil, Salad Oil, and Margarine." VPI University, Research Bulletin 96, 1974.
16. Mixon, B.J. and W.R. Morrison. "Economies of Size in Soybean Processing Plants, 1978." Agri. Exp. Sta. Bul. 840, Univ. of Ark., Fayetteville, 1979.
17. Markley, Klare S. *Soybeans and Soybean Products.* Interscience Publishers, Inc., Vol. 1 and 2, 1950.
18. Nakamura, H. and T.A. Hieronymus. "Structure of the Soybean Processing Industry." Univ of Ill., Agri. Exp. Sta. Bul. 706, 1965.
19. Tennessee Valley Authority, et. al. *The Soybean Status and Trends.* Bulletin Y-69, 1974.
20. Thurston, S.K., et. al., "Improving the Export Capability of Grain Cooperatives." U.S. Dept. Agriculture, Farmer Cooperative Service, FCS Res. Rep. 34, 1976.
21. U.S. Department of Agriculture. "Operational Data on Soybean Processing Cooperatives." Agricultural Cooperative Service, various years.
22. U.S. Department of Agriculture. "Cooperative Cottonseed Oil Mills Operating and Financial Results." Agricultural Cooperative Service, various years.
23. U.S. Department of Agriculture. "Regional Grain Cooperatives, 1978 and 1979." Agricultural Cooperative Service, ACS Res. Rpt. 3, 1981.
24. U.S. Department of Agriculture. "Crop Production." Crop Reporting Board, ESS, various issues.
25. U.S. Department of Agriculture. "Fats and Oils Situation." ESS, various issues.
26. U.S. Department of Agriculture. *Oilseeds and Products, Foreign Agriculture Circular.* June 1980.
27. U.S. Department of Agriculture. "World Economic Conditions in Relation to Agricultural Trade." Economic Research Service, 1977.
28. Wolf, W.J. and J.C. Cowen. *Soybeans as a Food Source.* CRC Press, Cleveland, Ohio, 1975.

# Appendix

**Appendix Table 1—Soybean production by region and United States, 1959-1979.**

Year	NE <sup>1</sup>	AP	DS	SE	SP	NP	CB	LS	US <sup>2</sup>
<i>1,000 bushels</i>									
1959	9,144	27,942	80,230	11,994	3,591	16,746	333,381	49,871	532,899
1960	10,858	32,503	76,618	14,759	4,445	21,179	347,899	46,824	555,085
1961	11,428	35,799	78,594	16,795	5,156	27,400	440,094	63,288	678,554
1962	9,879	36,672	87,636	16,875	4,204	27,749	433,720	52,451	669,186
1963	8,099	35,575	87,349	17,804	3,910	28,525	450,928	66,975	699,165
1964	6,120	41,717	100,007	23,910	3,651	30,004	428,830	66,682	700,921
1965	10,228	50,754	122,570	28,254	4,640	44,359	513,512	71,291	845,608
1966	5,672	58,733	147,885	35,281	6,181	54,840	524,845	95,044	928,481
1967	10,774	74,339	172,385	51,661	10,480	46,032	527,049	83,719	976,439
1968	9,929	60,021	186,322	35,092	12,519	50,884	665,185	87,006	1,106,958
1969	13,332	71,996	176,064	51,100	11,296	53,723	665,235	90,374	1,133,120
1970	10,754	68,348	197,562	50,077	7,754	38,852	658,051	95,702	1,127,100
1971	13,590	84,724	188,494	61,131	6,286	40,865	703,813	77,198	1,176,101
1972	13,782	89,329	168,223	50,902	9,030	58,457	772,901	107,984	1,270,608
1973	19,472	108,846	212,300	68,356	12,900	77,327	901,275	147,067	1,547,543
1974	19,905	98,470	175,440	74,861	11,568	58,058	676,125	101,860	1,216,287
1975	19,270	120,145	235,700	97,554	14,464	66,536	874,025	119,689	1,547,383
1976	17,369	102,189	216,580	76,523	14,522	39,020	739,990	81,367	1,287,560
1977	20,937	130,490	247,255	90,225	27,960	82,003	1,000,730	162,155	1,761,755
1978	26,745	153,070	267,850	112,940	25,098	85,973	1,026,265	172,240	1,870,181
1979	29,472	184,651	352,700	168,027	28,520	122,597	1,175,675	206,005	2,267,647

<sup>1</sup> NE - Northeast, AP - Appalachia, DS - Delta States, SE - Southeast, SP - Southern Plains, NP - Northern Plains, CB - Corn Belt, LS - Lake States, SW - Southwest, US - United States

<sup>2</sup> US totals may diverge slightly from the sum of region data due to estimation procedure.

Source: Crop Reporting Board

**Appendix table 2—Cottonseed production by region and United States, 1959-1979.**

Year	AP	DS	SE	SP	SW	CB	US <sup>1</sup>
<i>1,000 tons</i>							
1959	403	1473	685	2011	1190	211	5991
1960	334	1391	682	2006	1253	201	5886
1961	348	1477	638	2192	1148	160	5978
1962	341	1515	681	2140	1255	191	6139
1963	403	1735	783	1945	1123	184	6192
1964	421	1797	828	1863	1143	167	6237
1965	344	1646	769	2051	1102	160	6087
1966	189	1068	437	1415	775	68	3960
1967	82	858	261	1274	704	26	3210
1968	188	1309	382	1602	1066	84	4640
1969	207	1187	373	1303	857	132	4068
1970	225	1255	412	1321	753	95	4068
1971	261	1387	517	1125	772	169	4240
1972	271	1600	478	1782	1069	183	5393
1973	218	1258	426	1952	1080	75	5016
1974	169	1160	450	1106	1519	98	4510
1975	108	760	206	979	1084	79	3218
1976	116	931	254	1353	1424	67	4149
1977	119	1261	177	2254	1613	94	5521
1978	110	943	195	1626	1318	75	4269
1979	84	1034	221	2394	1997	64	5796

<sup>1</sup> US totals may diverge from the sum of region data due to estimation procedure.

Source: Crop Reporting Board

**Appendix Table 3—Peanut production by region and United States, 1959-1979.**

Year	AP	DS	SE	SP	SW	US <sup>1</sup>
<i>1,000 pounds</i>						
1959	463,760	1,875	734,860	308,690	11,008	1,523,218
1960	500,380	2,250	848,845	356,040	10,496	1,718,011
1961	471,320	2,500	835,055	334,760	13,464	1,657,099
1962	558,820	2,250	795,650	347,600	15,000	1,719,320
1963	542,270	1,662	1,032,700	348,680	16,776	1,942,088
1964	524,890	2,100	1,134,720	422,650	14,784	2,099,144
1965	659,220	2,100	1,241,820	470,520	15,936	2,389,596
1966	657,270	1,500	1,132,355	607,550	17,056	2,415,731
1967	602,870	1,625	1,314,290	542,550	15,920	2,477,255
1968	583,165	1,750	1,290,200	653,780	17,696	2,546,591
1969	580,335	3,200	1,341,310	593,070	17,479	2,535,394
1970	758,010	4,400	1,580,515	621,910	18,286	2,979,465
1971	544,980	16,483	1,841,340	585,755	16,560	3,005,118
1972	635,890	16,000	1,879,305	723,105	20,461	3,274,761
1973	788,850	16,625	1,924,495	724,925	18,942	3,473,837
1974	680,170	6,000	2,337,380	631,020	13,034	3,667,604
1975	658,305	13,485	2,469,280	695,900	20,152	3,857,122
1976	749,730	12,325	2,257,575	709,600	21,660	3,750,890
1977	737,085	11,550	2,289,900	662,100	25,380	3,726,015
1978	788,250	16,000	2,516,860	643,450	24,064	3,988,624
1979	633,480	15,355	2,509,280	797,025	25,300	3,980,440

<sup>1</sup> US total may diverge from the sum of region data due to estimation procedure.

Source: Crop Reporting Board

Appendix table 4—Flaxseed production by region and United States, 1959-1979.

Years	SP	NP	LS	US
<i>1,000 bushels</i>				
1959	462	13,561	5,016	21,237
1960	1,112	20,162	7,592	30,402
1961	1,610	13,288	6,444	22,178
1962	188	25,582	5,100	32,230
1963	635	22,325	7,104	31,041
1964	1,230	18,047	4,620	24,401
1965	940	27,526	6,216	35,402
1966	712	18,576	3,838	23,390
1967	150	15,972	3,783	20,036
1968	742	21,448	4,606	26,983
1969	1,300	27,501	5,820	34,929
1970	1,125	23,465	4,477	29,416
1971	70	14,566	3,480	18,198
1972	165	11,820	1,794	13,883
1973	80	13,153	3,119	16,408
1974	374	10,506	3,163	14,083
1975	480	12,160	2,875	15,553
1976	440	5,380	1,950	7,820
1977	90	11,790	3,190	15,105
1978	200	8,003	2,201	10,404
1979	45	11,275	2,219	13,539

<sup>1</sup> US total may diverge from sum of region data due to estimation procedure.  
Source: Crop Reporting Board

Appendix table 5—Sunflowerseed production by region and United States, 1974-1979.

Years	SP	NP	LS	US
<i>1,000 pounds</i>				
1974	6,300	243,320	146,225	395,845
1975	275,700	519,525	200,100	995,325
1976	70,750	545,600	223,200	839,550
1977	165,600	1,592,610	713,910	2,472,120
1978	20,300	2,532,240	985,600	3,538,140
1979	83,490	5,131,960	1,793,100	7,008,550

Source: Crop Reporting Board

Appendix table 6—U.S. exports of soybean cake and meal by region of destination

Region of destination	Five-year average 1973-77	1973	1974	1975	1976	1977	1978	1979
<i>1,000 metric tons</i>								
North & Central America	402	263	413	343	406	586	591	683
South America	84	8	102	66	85	158	177	285
West Europe	2,946	2,901	3,347	2,788	3,253	2,450	3,426	3,086
East Europe	739	914	790	564	921	507	1,176	1,428
Total Europe	3,685	3,815	4,137	3,342	4,174	2,957	4,602	4,514
Soviet Union	0	0	2	0	0	0	0	27
Africa	17	4	22	7	21	30	63	9
Asia	218	314	207	24	170	373	523	565
Australia & Oceania	15	11	27	1	6	29	5	4
Grand total	4,421	4,415	4,910	3,783	4,862	4,134	5,961	6,087



Appendix table 7—Soybean oil<sup>1</sup>: U.S. exports by country of destination, annual 1973-1979

Country of destination:	1973	1974	1975	1976	1977	1978	1979 <sup>2</sup>
<i>Metric tons</i>							
North America:							
Canada	19,092	33,709	21,543	29,419	27,291	27,976	19,845
Dominican Republic	1,787	11,821	17,348	10,400	8,645	18,425	28,359
Haiti	7,121	8,448	12,080	15,591	15,516	14,381	18,960
Mexico	20,168	87,197	23,774	1,940	15,327	34,252	729
Panama	6,145	19,249	11,654	12,129	12,678	10,845	16,772
Other	8,610	8,868	5,571	8,044	11,950	12,296	22,177
Total	62,922	169,290	91,970	77,522	91,407	118,175	106,842
South America:							
Chile	695	31,276	2,438	1,462	17,379	23,087	27,438
Colombia	6,702	7,674	7,707	19,554	38,093	51,158	83,287
Ecuador	12,356	12,425	12,497	19,344	22,837	21,211	21,267
Peru	50,243	56,297	17,540	29,363	58,079	63,332	24,527
Venezuela	40	177	0	268	504	412	18,988
Other	779	11,018	312	233	614	2,144	76,634
Total	70,814	118,867	40,496	70,223	137,505	161,344	252,141
West Europe	10,879	22,889	115	1,004	22,400	12,274	3,894
East Europe	32,198	39,689	49,053	5,037	0	1,514	23,792
Total Europe	43,077	62,578	49,168	6,041	22,400	13,788	27,686
Soviet Union	0	0	0	0	0	0	24,696
Africa:							
Egypt	872	2,807	1,889	1,147	4,690	3,909	13,336
Morocco	4,002	20,265	1,386	5,676	5,355	3,008	6,173
Somalia	0	0	0	230	0	4,691	6,991
Tunisia	27,250	24,373	10,365	179	2,523	3,169	5,044
Zambia	23	30	0	2,858	4,720	5,127	6,700
Other	10,024	17,571	6,484	5,590	6,690	17,885	20,297
Total	42,170	65,046	20,124	15,681	23,978	37,789	58,541
Asia:							
Bangladesh	7,121	16,220	28,888	23,986	20,702	26,713	53,020
China							
Mainland	58,344	0	0	0	61,793	44,203	58,817
Taiwan	12	8,000	3,000	101	0	20	10
Hong Kong	8	463	16	529	2,582	2,962	483
India	23,021	22,312	2,863	53,058	229,879	268,176	225,245
Iran	38,760	154,769	68,035	46,806	49,784	117,841	107,659
Israel	12,046	11,143	4,003	9,983	3,108	7,399	9,794
Japan	6,704	21,730	11,376	11,472	305	62	132
Jordan	328	355	148	150	217	290	233
Pakistan	59,800	89,133	10,138	168,321	97,936	95,814	163,539
Turkey	1,372	527	5,575	2,501	0	45	0
Other	7,316	12,281	4,942	10,151	2,645	12,210	11,554
Total	214,832	336,932	138,983	327,058	468,951	575,736	630,486
Australia & Oceania	5,011	9,379	15,598	13,482	29,550	22,449	28,942
Grand total	438,827	762,094	356,338	510,007	773,791	929,282	1,129,334

Note: Figures computed from unrounded data.

<sup>1</sup> Crude and refined oil combined. Includes shipments under P.L.-480 as reported by Census. Beginning in 1978, Excludes partially hydrogenated soybean salad oil.<sup>2</sup> Preliminary.

Source: U.S. Department of Commerce

Appendix table 8—Cottonseed oil<sup>1</sup>: U.S. exports by country of destination, annual 1973-1979

Country of destination	Five-year average 1973-77	1973	1974	1975	1976	1977	1978	1979 <sup>2</sup>
<i>Metric tons</i>								
<b>North America</b>								
Bahamas	96	135	150	78	53	63	30	17
Canada	7,485	7,745	13,359	8,445	4,474	3,403	5,596	5,520
Dominican Republic	5,252	2,997	12,12	4,590	4,523	2,037	10,431	34,160
Honduras	414	67	1	502	500	999	96	0
Jamaica	816	477	646	1,535	516	905	105	67
Mexico	6,600	26,229	6,747	0	12	12	220	34
Other	338	417	1,011	44	92	128	203	337
Total	21,001	38,067	34,026	15,196	10,171	7,547	16,681	40,135
<b>South America:</b>								
Brazil	3	2	13	0	0	0	0	0
Colombia	409	1,529	11	0	0	506	506	3
Ecuador	8	0	2	21	20	0	0	61
Venezuela	37,675	37,619	39,460	30,344	31,354	49,600	25,531	54,547
Other	9	17	19	0	8	1	67	399
Total	38,105	39,167	39,504	30,365	31,381	50,108	26,150	55,009
<b>Europe:</b>								
Belgium-Luxembourg	2,747	1,748	0	3,349	4,776	3,861	602	1
Denmark	0	0	0	0	0	0	7	21
France	15	26	15	0	12	24	196	44
Germany, F.R.	7,540	11,621	6,251	15,642	2,680	1,504	2,808	1,000
Ireland	40	148	50	0	0	0	0	0
Italy	1	0	1	3	0	3	0	8
Netherlands	5,205	5,540	3,863	300	6,210	10,115	1,916	4,036
United Kingdom	5,893	10,686	6,748	5,316	3,180	3,536	1,870	1,602
Total EC	21,441	29,769	16,928	24,610	16,857	19,042	7,398	6,712
Poland	2,526	9,609	3,023	0	0	0	0	0
Sweden	5,649	9,258	13,982	2,640	0	2,367	527	0
Switzerland	2,428	1,000	2,948	1,000	3,992	3,200	5,480	2
Other	506	604	0	912	8	1,003	13	1
Total	11,109	20,471	19,953	4,552	4,000	6,570	6,020	3
<b>Africa:</b>								
Egypt	150,365	92,537	126,940	192,431	138,309	201,611	180,005	116,324
S. Africa, Rep. of	1,441	4,207	2,997	0	0	0	0	0
Other	750	2,013	55	8	1,656	20	12	14
Total	152,557	98,757	129,992	192,439	139,965	201,631	180,018	116,337
<b>Asia:</b>								
Iran	12,488	512	10,990	19,636	11,172	20,133	50,080	30,367
Israel	2	0	0	0	8	0	1	0
Japan	15,933	18,075	17,793	7,582	13,942	22,274	29,317	34,546
Korea, Rep. of	598	526	258	515	896	792	938	1,517
Pakistan	0	0	1	0	0	0	10,431	0
Philippines	16	23	34	6	5	9	9	8
Other	1,005	172	916	683	2,998	258	59	205
Total	30,042	19,309	29,992	28,422	29,021	43,467	90,835	66,635
<b>Australia &amp; Oceania</b>								
	3,796	2,137	6,278	2,276	4,898	3,393	3,708	2,298
Grand Total	278,052	247,677	276,673	297,860	236,293	331,758	330,810	287,130

Note: Figures computed from unrounded data. Some discrepancies within totals may result.

<sup>1</sup> Crude and refined oil combined as such. Includes shipments under P.L.-480 as reported by Census.<sup>2</sup> Preliminary.

Source: U.S. Department of Commerce.













**U.S. Department of Agriculture  
Agricultural Cooperative Service**

Agricultural Cooperative Service provides research, management, and educational assistance to cooperatives to strengthen the economic position of farmers and other rural residents. It works directly with cooperative leaders and Federal and State agencies to improve organization, leadership, and operation of cooperatives and to give guidance to further development.

The agency (1) helps farmers and other rural residents obtain supplies and services at lower costs and to get better prices for products they sell; (2) advises rural residents on developing existing resources through cooperative action to enhance rural living; (3) helps cooperatives improve services and operating efficiency; (4) informs members, directors, employees, and the public on how cooperatives work and benefit their members and their communities; and (5) encourages international cooperative programs.

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