estimated that farmers planted 178,000 acres of flax in the 1994/95 marketing year. The availability of inexpensive imported flaxseed from Canada has exacerbated the decline in planted acres.

USDA estimated total demand for flaxseed at 9.2 million bushels for the 1994/95 marketing year, up slightly from 1993/94. Most of the demand will be met through imports, which in 1994/95 are expected to reach 6.3 million bushels (app. table 18), up 24 percent from 1993/94. Crush, the main component of the demand, is expected to climb to 8.8 million bushels, 100,000 bushels above the 1993/94 level.

The demand for linseed oil in 1994/95 is expected to mirror the demand for seed by increasing slightly to 178 million pounds, up 13 million pounds from 1993/94. Total supplies are expected to reach 238 million pounds in 1994/95, resulting in ending stocks of 60 million pounds. The same trend is expected for linseed meal, for which total supplies and total demand are expected to reach 169,000 and 164,000 short tons, respectively, in 1994/95.

"Linola," an edible flaxseed, has recently been developed in Canada. Canadian production is small but it works well in a rotation with canola. Its oil is similar to sunflower oil in taste and fatty acid content. As with canola, it will take years before the Food and Drug Administration approves the use of linola in the United States.

Trade Agreements

The GATT round of 1962 secured duty-free status for soybeans and soybean meal imported into the EU. This meant that protein feeds and other energy supplements were traded at or close to world prices, while the Common Agricultural Policy kept internal grain prices substantially higher than world prices. High internal grain prices created a price structure that favored the consumption of protein meals over grains, occasionally even as a source of energy. By the late 1970's, the EU had instituted lucrative subsidies to EU oilseed processors, allowing them to pay EU producers support prices far above world prices and to discriminate against foreign suppliers. EU oilseed acreage and production (particularly of sunflowerseed and rapeseed) soared, which helped the EU reduce budget expenditures by providing producers with an alternative to producing grains, which were in chronic surplus. This created surpluses of oil that were exported below world market prices. Export subsidies were also available for oilseeds but were little used because most oilseeds were purchased by domestic buyers. EU overproduction and increased competition from South America have cut U.S. exports and market share to the EU from the level of the late 1970's. In the late 1980's, the EU introduced production ceilings in an attempt to rein in expenditures on oilseed support. Although these ceilings were ineffective in limiting output, the rapid expansion in oilseed production of the early- to mid-1980's was slowed.

The U.S. Government, on behalf of soybean producers, filed a *Section 301* trade complaint in 1989 against the EU's oilseed policy. A GATT panel, formed to resolve the dispute, found that the EU oilseed subsidy regimes violated articles of the existing GATT agreement. The EU agreed to submit a reform proposal, which was implemented beginning in 1992. Producer price support was replaced with a direct payment based on acreage planted to oilseeds. But the regime did not require producers to set aside land and maintained high payments that encouraged continued high levels of oilseed production. The GATT panel reconvened to evaluate the EU's policy revisions and again ruled that the EU had not satisfied the original U.S. objections. The EU subsequently proposed a "rebalancing" scheme that would have lowered protection on cereals in exchange for increased tariffs on soybeans and corn gluten feed. U.S. trade negotiators opposed this plan.

Keeping intact many features of the 1992 oilseed regime, the EU adopted in May 1992 a major reform of the expensive CAP, which was implemented in 1993. To control supplies, EU grain price supports and oilseed area payments were reduced. Producers were also required to set aside a percentage of the land planted to grains and oilseeds to remain eligible for payments. Production of oilseeds on the set-aside area was allowed for industrial uses.

With impending trade sanctions on EU products at stake, U.S. and EU negotiators finally settled the lengthy dispute at a Washington, DC, meeting in late 1992. This so-called Blair House agreement establishes a separate base area for oilseeds, which limits the area on which payments are made without penalty. Full oilseed payments may be made on the base area minus a 10-percent minimum set-aside. Penalties for exceeding the oilseed area limits were outlined. The base area for rapeseed, sunflowerseed, and soybeans was set at 5.128 million hectares (12.7 million acres) for the EU-12 beginning in 1995/96. Oilseed meal production on set-aside land was also capped.

The new GATT agreement also requires substantial cuts in the value of subsidized exports and a 21-percent reduction in the quantity of subsidized exports. Tariffs, such as the duties levied by Japan, South Korea, and the United States on imported soybean oil, are slated for reductions.

Impact of GATT on the U.S. Oilseed Sector

By itself, the Blair House oilseed agreement will lead to slower growth in EU oilseed production and rising oilseed imports. In the absence of CAP reform, growing meal consumption, lower EU oilseed production, and continued high grain intervention prices would have provided incentives for increasing soybean and soybean meal imports. However, the oilseed agreement was implemented almost simultaneously with the broad CAP reform that included major reductions in internal grain prices. These price cuts are significantly affecting the European feed markets as the proportion of grains in feed rations rises. However, lower feed prices could stimulate greater consumption of meat and poultry in the EU, resulting in an expansion in total protein demand. The ultimate effect on EU oilseed production and import demand of these policy changes is unclear and will vary from farmers to feed compounders and from country to country.

Total EU meal consumption is expected to show a modest decline, primarily as a result of the changing price structure (lower feed grain prices under CAP reform and area restrictions from Blair House). This reduction could come from reducing imports from either South America or the United States. Lower EU seed production, combined with some drop in soybean imports, will contribute to sharp declines in annual EU vegetable oil exports from the record 4.6 million tons in 1991/92.

Under the Uruguay Round agreement (UR), higher world incomes will increase soybean meal and oil demand, although much of this growth will appear after the year 2000. In several markets, the UR will increase trade in livestock products rather than soybeans and soybean meal, meaning higher domestic soybean meal use. World demand for soybean meal-equivalent imports is projected to increase by an added 2 percent by 2005. This is 1.3 million tons of soybean meal-equivalent above baseline projections that exclude the agreement. The United States could capture the largest share of UR trade opportunities in soybeans and meal, increasing soybean exports by almost 1 million tons in 2005, about 4 percent above baseline projections. Soybean prices could rise 5-9 percent above baseline levels by 2005, and planted area could increase by about 2 million acres to meet increased demand. It is important to emphasize that these outcomes depend upon how the United States implements domestic acreage programs such as the *Conservation Reserve Program* (CRP). These results assumed no extension of CRP contracts.

Additional uncertainty for the outlook for EU protein meal demand is introduced by implementation of the U.S. Clean Air Act Amendments, which will likely result in increased U.S. ethanol production. Corn gluten feed, a major byproduct of ethanol production, will likely follow historical trends and be exported to the EU as a non-grain feed ingredient. This has additional potential to displace some protein meal in feed rations, but it is unclear how extensive this substitution will be.

The UR mandates reductions in export price subsidies for U.S. agricultural commodities but will not require reductions in U.S. loan rates. In fiscal year 1992, subsidies for EEP, SOAP, and COAP sales accounted for about 57 percent of U.S. vegetable oil exports. The UR requires subsidized exports of U.S. vegetable oils to progressively drop by 21 percent from a 1986-90 base. Programmed exports would fall from the 1991-92 level of 676,000 metric tons to 141,299 by the decade's end. As a result, the outlook for U.S. vegetable oil in the next several years is for higher domestic supplies that may reduce prices and crush margins and imports of competing oils. However, increased world demand for vegetable oils, particularly from developing countries, and higher world prices will more than offset export subsidy reductions in 2000 and beyond.

Impact of NAFTA on the U.S. Oilseed Sector

The North American Free Trade Agreement (NAFTA) was passed by Congress in November 1993 and signed by the Canadian, Mexican, and U.S. governments shortly after. Mexico had a seasonal tariff on soybeans of 15 percent. Under NAFTA, Mexico immediately reduced this tariff to 10 percent and reduced the dutiable season. Mexico also had a 15-percent tariff on soybean meal, a 10-percent tariff on crude soybean oil, and a 20-percent duty on refined soybean oil. All these duties will be phased out over 10 years, greatly expanding the opportunities for trade with the United States.

Mexico's soybean imports vary depending on domestic production, domestic coarse grain consumption, and the availability and price of protein and oil substitutes. The average annual level of Mexico's soybean imports was about 1.1 million tons in the 1980's. Soybean imports have ranged from 877,000 tons in

1985 to 2.2 million tons in 1991. Mexican imports of soybean meal recently have been about 400,000 tons, with soybean oil imports about 80,000 tons. The United States traditionally supplied about three-fourths of Mexico's soybean and soybean meal imports, annually totaling about $400 million.

Under NAFTA, U.S. soybean exports to Mexico are expected to be about 4.5 million metric tons by the end of the 10-year transition period. This is about 20 percent above what would be expected without NAFTA. Mexico has enough crush capacity to encourage imports of soybeans for crushing. Additionally, increases in protein feed demand will encourage a modest increase in soybean meal imports to 700,000 tons, or 12 percent above what would have occurred without NAFTA. By the end of the transition period, U.S. farm prices are expected to be about 2 percent higher than without NAFTA, and industry revenues are expected to be up by $400-$500 million (Office of Economics-ERS). In 1994, the first year of the accord, U.S. exports of soybeans and soybean meal to Mexico were up 18 percent and 96 percent, respectively, from 1993. Because of its increase in soybean imports, Mexican imports of U.S. soybean oil in 1994 are 31 percent less than the 1993 level. Trade in 1995 will be dampened by the substantial devaluation of the peso.

Even without NAFTA, U.S. oilseed and product exports to Mexico likely would have increased because of the expanding urban population and higher incomes, which lead to greater per-capita meat demand. Mexico is also modernizing its transportation infrastructure and has scaled back its own price subsidies to farmers for oilseeds, which should expedite imports and reduce Mexican production. However, lower tariffs will be the key to fulfilling Mexico's full trade potential. The export share of the United States should increase as imports from non-NAFTA countries will still be subject to the seasonal tariffs.

Implementation of NAFTA is projected to stimulate economic growth in Mexico, strengthening vegetable oil demand and imports. Mexico's 10-percent duty on crude sunflowerseed oil will be phased out over 10 years, reducing import prices, and strengthening the competitiveness of U.S. sunflowerseed oil exports to Mexico. Mexico is projected to continue to be a major market for U.S. sunflowerseed oil in the future and the total elimination of the 10-percent tariff should allow the United States to compete more effectively against competition from low-priced Argentine sunflowerseed oil.

Farm Program for Oilseeds and Issues

The 1991-95 crops of soybeans and minor oilseeds are affected by legislation passed in the 1990 Food, Agriculture, Conservation, and Trade Act (FACTA) and the Omnibus Budget Reconciliation Act (OBRA). The 1990 legislation extended many features of previous legislation pertaining to oilseeds including: the Export Enhancement Program (EEP), Export Credit Guarantee Program (GSM-102), *Intermediate Export Credit Guarantee Program* (GSM-103), the *0-92 program*, and the Conservation Reserve Program (CRP).

Unlike the conditions facing legislators in 1981 and 1985, the 1990 farm bill debate was set in an environment of a strengthening agricultural sector, rising farm income, declining debt, and gradually improving exports. Based on these successes, the overall structure of commodity programs built on past policies, and many of the underlying provisions remained largely intact.

However, the 1981 and 1985 acts did not fully address the competitiveness of the U.S. oilseed sector. One particular concern had been the continued decline in the U.S. share of world oilseed and oilseed-products trade and the associated drop in U.S. oilseed acreage. For example, between 1979 and 1990, U.S. acreage planted to oilseeds declined by roughly 18 million acres. This included a 19-percent decline in soybean acreage, a 65-percent decline in sunflower acreage, and a 73-percent decline in flaxseed acreage.

The decline, however, came during a period of steady growth in world demand for oilseeds, meal, and oil. With rising world demand and falling U.S. production, U.S. market share of world oilseed and oilseed-products trade declined from 51 percent in 1979 to roughly 32 percent in 1993. The final oilseed provisions in the 1990 farm act, combined with the 1990 Budget Reconciliation Act are, in part, a policy response to this issue.

To arrest the declining U.S. share of world trade in soybeans and products in the 1980's, something needed to be done to prevent U.S. soybean acreage from falling while foreign soybean acreage rose to record levels. While loan rates for soybeans in 1986-90 had been declining (to $4.50 per bushel by 1990), planted acreage also fell because farmers were effectively locked into planting corn and other program crops. The lower *loan rates* of the 1985 Act made higher export demand possible again, but a higher soybean supply was not forthcoming.

The 1985 Act changed the treatment of oilseeds so that they were no longer able to be planted on underplanted program *crop acreage base*. Farmers would not increase planted soybean area even when soybean prices were comparatively attractive. Planting an alternative crop on base acres resulted in an acre-for-acre loss of support payments and possibly a reduction in base starting the following year (McCormick, 1992). The 1988 Disaster Assistance Act attempted to increase production of soybeans by allowing producers in 1989 and 1990 to plant soybeans and sunflowers on 10-25 percent of their permitted acres. However, the provision was only marginally successful in increasing oilseed acreage as farmers gave up deficiency payments (but maintained base acres) for each oilseed acre planted. This loss required soybean prices to reach $7-8 per bushel to compete against corn and over $13 against cotton.

The 1990 OBRA broadened the flexibility provisions of the Disaster Assistance Act. In an effort to reduce budget outlays (an important theme in the 1990 legislation), flexibility provisions were modified to eliminate deficiency payments on 15 percent of program base acres (*normal flex acres* or NFA), regardless of whether the program crop or another crop was planted on such acres. Producers desiring more flexibility may plant alternative crops on up to an additional 10 percent of the program crop base (*optional flex acres* or OFA). The producer's base is protected, but deficiency payments are forgone. Planting an alternative crop on NFA will not directly affect program benefit levels. By removing the influence of program crop target prices on NFA acreage, planting decisions are more responsive to market price signals. On the additional 10 percent, the producer will still consider deficiency payments in making planting decisions.

All oilseeds planted on flex acres are eligible for *nonrecourse loans*. However, USDA has discretion to exclude any crop from flex acres. If USDA determines that the soybean price will be less than $5.27 (105 percent of the loan rate), USDA must prohibit soybeans on the optional flex acres. The act removed sunflower, safflower, flaxseed, and mustard seed as accepted *conserving use* crops. The law also permits USDA to allow designated crops to be planted (with an acre-for-acre reduction in payment acres) on up to 50 percent of the *reduced acres*; USDA has never exercised this authority, however.

Under the FACTA, *marketing loan* provisions are made mandatory for soybeans and minor oilseeds (sunflowers, canola, rapeseed, safflowerseed, flaxseed, and mustard seed) with minimum basic loan rates set at $5.02 per bushel for soybeans and $8.90 per hundredweight for other oilseeds. Producers may repay price support loans at the lesser of the loan rate plus interest or the announced loan repayment rate (LRR). For each oilseed, the actual LRR is equal to the lesser of the applicable county loan rate or the announced loan repayment rate. Producers who are eligible to obtain a price support loan for a crop of oilseeds, but who agree to forgo the loan, may obtain a loan deficiency payment (LDP). The LDP rate is equal to the amount by which the applicable county loan rate exceeds the announced county LRR for a given oilseed.

The 1990 OBRA created a loan origination fee for each oilseed for which price support loans or loan deficiency payments are made. This provision recouped government revenues on loans made for oilseeds. The fee was 2 percent of the value of the loan, making the effective loan rate $4.92 per bushel for soybeans and $8.72 per hundredweight for minor oilseeds for 1991-93 crops.

The 1990 FACTA continued the prohibition on any production adjustment program for oilseeds as a condition for price support loans or loan deficiency payments. Oilseeds are not eligible for any commodity reserve storage program and producers cannnot receive payments to cover oilseed storage costs. The annual payment limitation for loan deficiency payments and marketing loan gains was reduced from $200,000 to $75,000 per person. The limit is $250,000 when combined with deficiency and diversion payments from other program crops and CRP payments.

When an acreage reduction program is in effect, the 0-92 program allows producers to underplant *permitted acres* from their wheat and feed grain crop acreage base and receive 92 percent of the projected deficiency payment rate. Eight percent must go into conserving uses or other allowed crops. This optional program does not affect the producer's base acreage or program yield. By not requiring production of a crop to obtain deficiency payments, this program gives producers added flexibility and promotes soil and water quality through less intensive use. This program protected farm incomes in 1993 when many Midwestern fields were flooded or too wet to be planted to any crop.

Producers may shift to any combination of minor oilseeds while maintaining 92 percent of their wheat or feed grain deficiency payments. However, producers who opt for the 0-92 payments on such acres are not eligible for oilseed loan support for that minor oilseed planted anywhere on the farm. The producer may re-

linquish the 0-92 deficiency payments to be eligible for marketing loans on acres planted to minor oilseeds. The decision to shift to a minor oilseed under the 0-92 option will depend on the expected market returns for competing crops, experience and capital required to establish the crop, relative yields, and price risks.

The 1990 Act broadened the mission of the former Targeted Export Assistance program by replacing it with the Market Promotion Program (MPP). The redefined $90-million program assists trade organizations to develop, maintain, and expand export markets for U.S. agricultural products. The CCC shares promotion costs with eligible organizations (producer cooperatives, trade groups, State agricultural agencies, and private companies) that implement a foreign market development program. Program tools include technical assistance to food processors, trade servicing, nutritional information, supermarket promotions, and advertising. For fiscal year 1994, MPP funded the American Soybean Association with $1.72 million to promote soybean oil in foreign markets.

While the *Federal Crop Insurance Corporation (FCIC)* subsidized up to 30 percent of crop insurance *premiums*, enrollment in the program had never exceeded 35 percent of soybean acres planted, even after widespread crop failures. Most farmers still found premiums to be too high to justify the coverage of their loss expectations. The low participation had been limited to producers who knew that their potential *indemnities* would likely exceed their premiums. Consequently, total premium payments were too small to fully cover the total indemnities paid. Losses in excess of premiums for soybeans (totaling over $591 million) accounted for 29 percent of all FCIC excess losses from 1981 through 1989. *Loss ratios* were highest in the South; Arkansas, Georgia, Louisiana, and Mississippi combined accounted for 72 percent of FCIC soybean program losses. Also, benefits were not equitably distributed. Insured farmers with catastrophic losses who also received ad hoc disaster payments often obtained an income larger than if they had experienced a normal crop or only a one-third crop loss. This means that farmers with insurance would use production practices that would not minimize yield losses but increase their chances of receiving an indemnity, leading to even larger financial costs to FCIC. Between 1983 and 1990, 40 percent of the excess losses were on only 1.4 percent of the soybean policies.

The 1990 legislation omitted major revisions to *Federal crop insurance* except to require FCIC to adopt rates and coverage that will improve its actuarial soundness. In response, FCIC raised premium rates in high-loss regions and improved monitoring for abnormal loss histories of individual policyholders. In 1992, FCIC also approved a pilot program for soybeans that based crop insurance on area-yields in 13 States where individual-yield coverage has had a poor actuarial record.

Congress passed in 1994 a reform of Federal crop insurance that provides catastrophic yield protection for losses of 50 percent (based on actual farm production history). Participating farmers will receive 60 percent of the expected market price. To be eligible for farm programs, producers will be required to pay a $50 registration fee per crop per county for catastrophic coverage. Farmers also will be able to purchase higher coverage levels if desired. Participation in the program will improve as the government eliminates ad hoc disaster payments.

Effects of the 1990 Legislation

Two aspects of the 1990 legislation, planting flexibility and oilseed marketing loan provisions, had immediate implications for the oilseed industry. These programs applied to producers of soybeans, sunflower seed (oil and nonoil types), canola, rapeseed, flaxseed, safflower, mustard seed, and such other oilseeds as the Secretary of Agriculture may determine.

Because the programs were aimed primarily at producers, most of the impacts were driven by changes in supply. Reducing the percentage of payment acres lessens the pressure on USDA to reduce program costs by idling acreage through ARP's. Subsequently, potentially more acres can be flexed to soybeans and other oilseeds. The new flexibility provisions also reduce the effective return of program crops that compete with oilseeds on the NFA. This encourages farmers to consider the market value and loan support levels of soybeans and special oilseeds. While the current loan levels alone are not likely to encourage large shifts toward oilseeds, they do offer producers a degree of insurance. In effect, the loan establishes a price floor for producers by protecting against downside price risk. Tying repayment rates to market conditions is more likely to keep the seed in the marketing channel than a conventional nonrecourse loan and prevents a buildup of government stocks. Larger supplies at reasonable prices have bolstered the U.S. position in the world market.

By raising borrowing costs to farmers, OBRA's loan origination fee reduced participation in the marketing loan program by about one-half from 1990. Thus, the

loan origination fee prevented producers from taking advantage of the marketing advantages of the program. The fee was eliminated in 1994, and starting with the 1994 crop, the new loan rates are $4.92 for soybeans and $8.72 per cwt. for the minor oilseeds. In 1994, a provision was also added that farmers are required to pay back the loan within the fiscal year that it is taken out.

Program forfeitures and related costs to date for oilseed marketing loans have been minimal because of their low levels compared with market prices. Direct outlays incurred from marketing loan provisions have ranged from $2 million for the 1993 crop to $30 million for the 1991 crop. Virtually all of the direct outlays have been made to minor oilseed producers; soybean prices above loan rates have precluded payments to soybean producers. Among the minor oilseeds, most of the outlays have been made for oil-type sunflower. However, flaxseed has received relatively more support, with almost 70 percent of the crop receiving payments over the 3-year period compared with 35 percent for oil-type sunflower. About 15 percent of the canola, rapeseed, and confection sunflower have received payments. Mustard seed and safflower prices have exceeded loan rates over the period, so few program payments have been made for these crops. The largest public expenditures for oilseeds have been for disaster assistance, most recently in 1993.

The impact of the 1990 flexibility legislation can also be found in the USDA compliance reports of annual program signup. In 1994, U.S. farmers planted 5.914 million acres of soybeans on flex acres. Of that total, 4.118 million oilseed acres were flexed from corn base and 1.344 million from wheat base. Acreage flexing in 1994 was similar to 1991 and 1992 levels. The potential normal flex acreage was 26.2 million acres and optional flex acreage was 17.5 million. This means that only 16 percent of potential flex acres were shifted from the original program crop.

The low use of flexing was due to a comparatively lower soybean-to-corn price ratio since 1991 (2.5) versus the 1986-90 period (2.8) covered by preceding farm legislation. But farmers are now better able to respond quickly to future commodity market shocks than before 1991.

The 1991 signup also indicated that farmers flexed 295,000 acres to minor oilseeds, with most of that acreage derived from wheat and barley base acreage. In 1992, the compliance report showed that 226,000 acres were flexed to minor oilseeds, while in 1993 and 1994 farmers flexed 428,000 and 459,000 acres, respectively.

The USDA compliance reports also indicate that producers have used the 0-92 option to plant additional minor oilseeds. Roughly 532,000 acres of minor oilseeds were planted on program base, distributed about equally between wheat (268,535) and feed grains (263,009). Farmers in the tri-State region (North Dakota, South Dakota, and Minnesota) utilized the 0-92 minor oilseed option to the fullest, accounting for nearly 75 percent of national base shifted to minor oilseeds. Many of the producers in these States have experience in growing minor oilseeds and have access to established markets. The same kind of response was observed in the following years, when farmers used the 0-92 option to plant 367,000 acres of oilseeds in 1992, 811,000 acres in 1993, and 1,584,000 acres in 1994.

Average U.S. soybean acres planted in 1991-94 were only slightly above the previous 5 years' plantings, although many acres went unseeded in 1993 due to major flooding and wet soil conditions. While planted acreage has increased since 1990 in the eastern and western Corn Belt, soybean acres in the Delta and Southeast have continued their descent. During the FACTA years, 1991-94, annual soybean acreage averaged 60.1 million acres, compared with 59.2 million during 1986-90.

Table 14—Minor oilseeds: U.S. planted and harvested acres, 1991-94

Oilseed	Area planted				Area harvested			
	1991	1992	1993	1994	1991	1992	1993	1994
				1,000 acres				
Sunflower	2,746	2,187	2,757	3,567	2,673	2,043	2,486	3,430
Safflower	223	341	404	240	209	307	293	228
Flaxseed	356	171	206	178	342	165	191	171
Canola	155	140	199	354	147	112	187	340
Mustard seed	19.4	15.3	18.1	13.6	18.1	14.8	16.4	13.4
Rapeseed	18.2	12.0	7.2	7.4	15.6	9.8	6.1	6.7

U.S. farmers planted 3.57 million acres of sunflowers in 1994, up 87 percent from 1990 (table 14). Farmers also planted 354,000 acres of canola, 240,000 acres of safflower, and 178,000 acres of flaxseed. These acreage levels represent a 30-percent decrease for flaxseed compared with 1990, and increases of 8 percent and 128 percent for safflower and canola, respectively, compared with 1991, the first year that acreage statistics were compiled for minor oilseeds.

One notable change in the final program implementation rules was the division of sunflower seed into two separate categories: "oil" and "other" types, the latter including confection varieties and varieties grown specifically for bird seed. This was an important shift for confection and bird seed growers. Based solely on oil content, these seeds are severely discounted relative to oil-type sunflowers.

With implementation of the 1990 farm legislation, the financial attractiveness of minor oilseeds has increased relative to crops that traditionally dominate land use. Since 1991, farmers have responded to these changes by expanding minor oilseed acreage. Helped by promising growing conditions in the areas where minor oilseeds are traditionally grown, the total area of sunflower seed and other minor oilseeds has increased.

Issues for 1995 Farm Legislation

Given the relatively healthy finances of the farm sector, it is probable that Federal deficits will encourage Congress to find ways to shrink the $10-$12 billion spent annually on farm programs. Spending reductions for the export programs are required by the new GATT accord. Appropriations for FY1995 for EEP, MPP, and PL-480 already have been reduced somewhat from FY1994. However, the administration has indicated that it would redirect spending toward measures such as conservation, alternative uses, export credit, market promotion, crop insurance, and research/extension programs, that is, measures that do not distort trade.

Federal programs still favor planting wheat, feed grains, and cotton and discourage domestic production of oilseeds. One proposal would reduce target prices for program crops. Flexibility could be further increased by allowing alternative crops to be planted on a larger portion of a farmer's base or on conserving use acreage with no loss in payments or payment acres. There may be a proposal to maintain program crop bases but reduce payment acres from the current 85 percent to reduce outlays and provide more planting flexibility. Alternatively, soybeans and possibly minor oilseeds could be included in a whole-farm acreage base, with one commodity substituting for another without loss of base or payments. The 0-92 program could then be phased out. Each proposal has widespread implications for farm program participation and costs, farm prices and incomes, and land values.

The number of acres involved with a continuation of the CRP has ramifications for all field crops, including oilseeds. The first CRP contracts would have expired beginning September 1995, with contracts lapsing on about 16 million acres by January 1997. The reserve currently totals 36.5 million acres with a legislated target of 38 million. But in late 1994, the Secretary of Agriculture announced several discretionary changes in the program. Farmers who obtained 1-year extensions for 1995 (2.2 million acres) have the option to extend for another 9 years. In 1995, farmers may also terminate the contracts or modify them to reduce the acreage covered. In 1996, farmers with current CRP contracts will have the option to modify and extend contracts at maturity (10-year extension for contracts signed before November 28, 1990, and a 5-year extension for later contracts). Rental rates on extended contracts will be reevaluated. USDA will also consider bids for new 10-year contracts subject to more stringent environmental and conservation criteria. Long-term easements, through the Wetlands Reserve Program, will also be offered on environmentally sensitive lands, such as lowlands bordering rivers.

How much acreage remains in the CRP will depend on market returns, modifications in eligibility criteria, and funding constraints. USDA estimates that the CRP would gradually decline to 32.1 million acres by 2005, of which 3.9 million are allocated from soybeans. However, given current budget rules and priorities, it is unlikely that the government will continue to appropriate nearly $2 billion annually on the CRP in addition to deficiency payments. A survey indicated that only 13 percent of enrolled acres would remain in CRP if landowners were offered half their current rental rate.

Stewardship payments may be explored as a means to target the most environmentally sensitive land (based on its erodibility, leachability, and presence of wetlands or endangered species). These incentive payments would not be intended to support farm income directly but be made in exchange for environmental services. Another proposal is to grant tax credits on farm equipment purchased for the purpose of satisfying conservation compliance requirements.

The prospect of large domestic supplies of vegetable oils has prompted the oilseed industry to propose a plan to advance commercialization of industrial vegetable oil uses. The plan would require USDA to operate EEP to its maximum level allowed by the new GATT accord. The plan would create a fund from export program savings from 1991-92 levels to be distributed to firms that use vegetable oils in industrial uses. The value of soybean oil exports under government-assisted programs totaled $116.7 million in fiscal year 1991, compared with $192 million in total exports. The biodiesel industry also seeks a blending tax credit similar to those granted to alcohol fuels.

On the other hand, some of the public have called for elimination of the EEP, which could reduce soybean oil exports to North Africa and the Middle East. U.S. soybean oil prices would fall relative to world prices, which would reduce competing oil imports and help regain export competitiveness.

Continued support for export credit programs will be important for sustaining import growth by the former Soviet Union and other developing countries. However, without changes in criteria for determining creditworthiness and a reduction of its external debt, it is unlikely that the FSU would be able to use the credits.

Public funding of oilseeds research grants and cost-sharing agreements that benefit producers and consumers alike will continue to be a critical issue. Research into commercializing new industrial uses, pest and disease control, natural resources management, and development of varieties with higher oilseed quality will determine the future productivity growth of the U.S. oilseeds sector. Finding commercially viable new uses for oilseeds will lessen farmers' dependence on Federal support programs. Recent breakthroughs include a bioengineered soybean variety approved by USDA that is tolerant to an environmentally safer herbicide. It will soon be available to farmers, pending EPA approval of that herbicide's use for soybeans. Such varieties could increase yields and lower production costs for producers. Research on new IPM methods could help reduce the use of chemical pesticides. Scientists are seeking to increase shelf life of soybean oil and lower its saturated fat levels. Breeding soybean varieties with reduced linolenic acid content could eliminate flavor problems in the oil and also make it better suited for soy ink and biodiesel use. Consumers may also benefit from research defining the health aspects of trans-fatty acids, a type of fat produced in the hydrogenation process for vegetable oils. A bioengineered canola variety is near introduction where the oil has a higher melt point, which eliminates hydrogenation and the production of trans-fatty acids in margarine.

Soybean quality has been a trade competitiveness issue. South American soybeans have been superior to U.S. exports in their oil and protein content. Currently, the farm price of soybeans does not reflect its potential value of oil and meal products but is based on test weight, foreign material, and damage levels. Farmers plant soybean varieties with the maximum potential yield and have little or no incentive to plant high-oil, high-protein varieties. Component pricing (which incorporates oil and protein content in the Federal grading of soybeans) has been proposed as a solution to this problem. However, resistance to this proposal has been due to farmers' and processors' uncertainty of their returns under this system. Merchandisers assert that the costs of segregating soybeans of varying oil and protein levels would be prohibitive to them. Yet, Japanese and Taiwanese buyers already request oil and protein information in their contracts and many other importing countries are following suit. A research program to improve oil yields of soybean varieties without sacrificing field yields would give farmers more tools to compete in the quality arena.

There likely will be proposals to deal with yield and price risk. One proposal that has received a lot of attention is the "revenue assurance" plan put forth by a group of Iowa producers. This plan would combine separate programs dealing with yield and price risk into a single plan that would stabilize annual revenue at 70 percent of 5-year average market revenue.

Another proposal would privatize yield risk with an *area yield options contract.* Farmers would insure a crop by buying a yield *put option* for the expected yield in the region where they produce. The value of the put option would be the difference between the coverage level selected by the farmer and the actual yield. The premium and indemnity are determined by the area's yield rather than an individual producer's yield. The Commodity Futures Trading Commission recently approved a Chicago Board of Trade application to begin trading yield insurance options for several commodities. The options will be used by crop insurance companies to hedge against volatile changes in crop conditions. Continuing to educate farmers on the use of risk management instruments, such as the Options Pilot Program, would complement these other initiatives.

Glossary

Area yield options contract—A contract entitling the holder to receive a payment when the area yield is below (above) the put (call) options strike yield. The strike yield is the yield at which the holder of an option contract can exercise the option.

Commodity Credit Corporation (CCC)—A federally owned and operated corporation within the U.S. Department of Agriculture created to stabilize, support, and protect farm income and prices through loans, purchases, payment, and other operations. All money transactions for agricultural price and income support and related programs are handled through the CCC; the CCC also helps maintain balanced, adequate supplies of agricultural commodities and helps in their orderly distribution. The CCC does not have any operating personnel or facilities.

Conservation compliance—A provision that requires farmers with highly erodible cropland to implement an approved conservation plan. The plan must be completed by 1995 for the farm operation to remain eligible for specified Federal program benefits.

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

Conservation tillage—Any tillage and planting system that maintains at least 30 percent of the soil surface covered by residue after planting to reduce soil erosion by water; or where soil erosion by wind is the primary concern, maintains at least 1,000 pounds (per acre) of flat, small grain residue equivalent on the surface during the critical wind erosion period. Two key factors influencing crop residue are (1) the previous crop, which establishes the initial residue amount and determines its fragility, and (2) the type of tillage operations prior to and including planting.

Conserving use—Land idled from production and planted in a soil-conserving crop, such as annual, biennial, or perennial grasses, or other soil-conserving crop.

Crop acreage base—A farm's 5-year average acreage planted to wheat and feed grains, plus land not planted because of acreage reduction or diversion programs during a period specified by law. Crop acreage bases are reduced by the portion of land placed in the Conservation Reserve Program (CRP) for the duration of the 10-year contract.

Crop year—September 1 to August 31 for soybeans, sunflowerseed, safflower, and mustard seed. June 1-May 31 for canola, rapeseed, and flaxseed.

Emulsifier—A substance that enables the mixing of normally unmixable liquids. Lecithin, a byproduct of soybean oil extraction, is a common agent to prevent separation of water and oil in liquids that contain both, e.g. mayonnaise, ice cream.

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

Export Enhancement Program (EEP)—A program initiated in May 1985 under a Commodity Credit Corporation (CCC) charter to help U.S. exporters meet competitors' prices in subsidized markets. The program was formally authorized by the Food Security Act of 1985. Under the EEP, exporters are awarded cash bonuses enabling them to sell vegetable oils to specified countries at prices below those of the U.S. market.

Farmer-Owned Reserve (FOR)—A program for wheat and feed grain producers under which they may place eligible grain in storage after maturity of their regular price support loans. FOR loans are for 27 months with one 6-month extension at the Secretary's discretion. The loans are nonrecourse in that farmers can forfeit the commodity held as collateral to the Government in full settlement of the loan without penalty and without paying accumulated interest. Under certain market conditions, storage programs are made by the Commodity Credit Corporation and no interest accrues on the loan.

Fatty acids—A type of organic fat compound produced when glycerine is split off from the triglycerides in vegetable oils. The most commonly occurring fatty acids in vegetable oils are: unsaturated and polyunsaturated (linoleic, oleic, linolenic); and saturated (palmitic and stearic). Oleic, linoleic, and linolenic acids are used in industrial cleaners.

Federal crop insurance—A subsidized insurance program that provides farmers with a means for risk management and financial stability against crop pro-

duction loss. The insurance is available for 50 different crops, varying by county. Participation in the program is often required for a farmer to qualify for Federal emergency loans.

Federal Crop Insurance Corporation (FCIC)—A Federal corporation within USDA that administers the Federal Crop Insurance Program.

Indemnity—The amount that a farmer receives as settlement on a loss claim. It is calculated by multiplying the price election by the number of bushels of loss below the yield guarantee.

Integrated pest management—The control of pests or diseases by using an array of crop production strategies, combined with careful monitoring of insect pests or weed populations and other methods. Some approaches include selection of resistant varieties, timing of cultivation, biological control methods, and minimal use of chemical pesticides so that natural enemies of pests are not destroyed. These approaches are used to anticipate and prevent pests and diseases from reaching economically damaging levels.

Intermediate Export Credit Guarantee Program (GSM-103)—A program established by the Food Security Act of 1985 which complements the Export Credit Guarantee Program (GSM-102) but guarantees repayment of private credit for 3-10 years.

Loan deficiency payment—Producers who are eligible to obtain a price support loan for a crop of oilseeds, but who agree to forgo the loan, may obtain a loan deficiency payment. The loan deficiency payment is equal to the loan repayment rate times the quantity of an oilseed that is eligible to be put under loan. The loan deficiency payment rate is equal to the amount by which the applicable county loan rate exceeds the announced county loan repayment rate for a given oilseed.

Loan rate—The price per bushel at which the Commodity Credit Corporation will provide loans to farmers enabling them to hold their crops for later sale. USDA was required to announce 1992-95 loan rates by November 15 prior to the calendar year in which the crop was harvested.

Loan repayment rate—Producers may repay price support loans at the lesser of the loan rate plus interest (or the prevailing world market price) or the announced loan repayment rate.

Loss ratio—Total indemnities paid out divided by total premiums collected (including the premium subsidy) by the Federal Crop Insurance Corporation (FCIC).

Marketing loans—This program allows producers to repay nonrecourse price support loans at less than the announced loan rates whevever the world price for the commodity is less than the loan rate.

Miso—Made from soaked, steam-heated soybeans that are inoculated with mold cultures grown on rice. The mixture is then allowed to ferment and age for months until a solid paste forms. Used as a soup base and condiment.

Mulch-till—The soil is disturbed prior to planting. Tillage tools such as chisels, field cultivators, disks, sweeps, or blades are used. Weed control is accomplished with herbicides and/or cultivation. More common on the flatter slopes of northern production areas.

No-till—The soil is left undisturbed from harvest to planting except for nutrient injection. Planting or drilling is accomplished in a narrow seedbed or slot created by coulters, row cleaners, disk openers, in-row chisels, or roto-tillers. Weed control is accomplished primarily with herbicides. Cultivation may be used for emergency weed control. Best suited for sloping lands that are highly erodible.

Nonrecourse loans—The major price support instrument used by CCC. Farmers who agree to comply with all commodity program provisions may pledge a quantity of a commodity as collateral and obtain a loan from the CCC. The borrower may elect either to repay the loan with interest at any time prior to maturity and regain control of the collateral commodity or default on the loan. The loan matures on the last day of the ninth month following the month the agreement is approved by CCC. In case of a default, the borrower forfeits without penalty the collateral commodity to the CCC. Stocks may be stored on the farm in approved structures or off the farm in approved commercial warehouses. Oilseeds forfeited to the CCC may not be sold at less than the lower of 105 percent of the loan rate (adjusted for location, grade, and quality) or 115 percent of the loan repayment rate.

Normal flex acreage—This provision of the Omnibus Budget Reconciliation Act of 1990 (P.L. 101-508) requires a mandatory 15-percent reduction in payment acreage. Under this provision, producers are ineligi-

ble to receive deficiency payments on 15 percent of their crop acreage base (not including any acreage removed from production under any production adjustment program). Producers, however, are allowed to plant any crop on this acreage, except fruits and vegetables.

Optional flex acreage—Under the planting flexibility provision of the 1990 Act, producers can choose to plant up to 25 percent of the crop acreage base to other Commodity Credity Corporation-specified crops (except fruits and vegetables) without a reduction in crop acreage bases on the farm, but receiving no deficiency payments on this acreage. The Omnibus Budget Reconciliation Act of 1990 (P.L. 101-508) made a 15-percent reduction in payment acreage mandatory. The remaining 10 percent is the optional flex acreage.

Permitted acreage—The maximum acreage of a crop that may be planted for harvest within a program. The permitted acreage is computed by subtracting the acreage reduction program requirement from the crop acreage base minus the diversion acreage (if applicable). For example, if a farm has a crop acreage base of 100 acres and 10-percent acreage reduction is required, the permitted acreage is 90 acres.

Premium—The amount that a producer is charged for the purchase of crop insurance. A farmer's premium depends on that farmer's production history and selection of coverage. Total premium is subsidized at up to 30 percent by FCIC.

Put option—The right, without obligation, to sell a futures contract at a specified price during a specified time period.

Reduced acres—Producers participating in the annual acreage reduction program (ARP) must devote the ARP percentage times the crop acreage base into the Acreage Conservation Reserve, or reduced acres. This land must be put into an approved conserving use that protects it from weeds, and from wind and water erosion. Also known as Acreage Conservation Reserve (ACR).

Ridge-till—The soil is left undisturbed from harvest to planting except for nutrient injection. Planting is completed in a seedbed prepared on ridges with sweeps, disk openers, coulters, or row cleaners. Residue is left on the surface between ridges. Weed control is accomplished with herbicides and/or cultivation. Ridges are rebuilt during cultivation.

Section 301—A provision of the U.S. Trade Act of 1974 that allows the President to take appropriate action to get a foreign government to remove any act, policy, or practice that violates an international agreement. The provision also applies to practices of a foreign government which are unjustified, unreasonable, or discriminatory, and which burden or restrict U.S. commerce.

Stabilizer—A substance that helps other substances resist chemical change.

Sunflowerseed Oil Assistance Program (SOAP)—Authorized under the Rural Development, Agriculture and Related Agencies Appropriations Act of 1988. The CCC awards bonuses in the physical commodity (sunflowerseed oil) or cash to exporters to facilitate exports in targeted markets.

Surfactant—A substance that reduces the surface tension of liquids. Commonly used in detergents.

Tempeh—A soy food product developed in Indonesia in which soybeans are soaked overnight and then cooked for a short time; the cooked soybeans are inoculated with a fungus and allowed to stand for 18-48 hours. The product is roasted, cooked in soup, or fried in oil; may also be sliced and dried.

Tofu—A cheese-like product made from coagulated soy milk.

World price—The cost, insurance, and freight (c.i.f.) price of an imported oilseed at a principal port (e.g., Rotterdam).

0-92 program—A program provision that allows wheat and feed grain producers to devote all or a portion of their permitted acreage to conserving uses or to a minor oilseed crop and receive deficiency payments on that acreage. The program makes deficiency payments for a maximum of 92 percent of a farm's maximum payment acreage. Under other types of acreage diversion programs, such as acreage reduction programs, producers cannot receive deficiency payments unless permitted acres are devoted to producing a crop.

Additional Readings

Ackerman, Karen Z., and Mark E. Smith. *Agricultural Export Programs: Background for 1990 Farm Legislation.* Economic Research Service, U.S. Dept. Agr., May 1990.

Ali, Mir. "Trends in Costs of Production for Corn, Soybeans, and Wheat, 1975-1991. *Agricultural Income and Finance Situation and Outlook Report,* Economic Research Service, U.S. Dept. Agr., AFO-50, Sept. 1993, pp. 41-43.

_____ and William McBride. *Soybeans: State-Level Production Costs, Characteristics, and Input Use, 1990.* SB-873. Economic Research Service, U.S. Dept. Agr., Feb. 1994.

Ash, Mark. *Animal Feeds Compendium.* AER-656. U.S. Dept. Agr., Economic Research Service, May 1992.

Bickerton, Thomas W. *USSR Oilseed Production, Processing, and Trade.* AER-232. Economic Research Service, U.S. Dept. Agr., Sept. 1987.

Bull, Len, Herman Delvo, Carmen Sandretto, and Bill Lindamood. "Analysis of Pesticide Use by Tillage System in 1990, 1991, and 1992 Corn and Soybeans," *Agricultural Resources: Inputs Situation and Outlook Report,* AR-32. Economic Research Service, U.S. Dept. Agr., Oct. 1993, pp. 41-54.

Carter, Jack F. "Shine On, Sunflower," *Science of Food and Agriculture.* Vol. 5, No. 1. Ames, IA: Council for Agricultural Science and Technology, Jan. 1987, pp. 2-7.

Castaneda, Jaime, and Mary Anne Normile. "U.S.-EU Oilseed Agreement and CAP Reform: The Impact on U.S. Oilseed Exports," *Oil Crops Situation and Outlook Report.* OCS-40. Economic Research Service, U.S. Dept. Agr., Jan. 1994, pp. 18-22.

Collins, Keith J., and Larry Salathe. *The Basic Mechanisms of U.S. Farm Policy: How They Work, with Examples and Illustrations.* MP-1479. Economic Research Service, U.S. Dept. Agr., Jan. 1990.

Crowder, Brad and Cecil W. Davison. *Soybeans: Background for 1990 Farm Legislation,* AIB-592, Economic Research Service, U.S. Dept. Agr., Mar. 1990.

Dinosson, W.E., R.L. Harold, and J.N. Johnson. "Sunflowerseed Oil Meal in Rations for Growing and Finishing Swine," *Journal of Animal Science,* 53 (Supplement 1): 1981, p. 95.

Erickson, David R., Everett H. Pryde, Ordean L. Brekke, Timothy L. Mounts, and Richard A. Falb, Eds. *Handbook of Soy Oil Processing and Utilization.* St. Louis: American Soybean Association and American Oil Chemists' Society, 1980.

Fryer, E., and R. Hoskin. "U.S. Vegetable Oil Price Relationships," *Oil Crops: Situation and Outlook Report.* OCS-9. Economic Research Service, U.S. Dept. Agr., Dec. 1985.

Glaser, Lewrene, Irshad Ahmed, Donald Van Dyne, and Mary Anne Normile. "Fats and Oils," *Industrial Uses of Agricultural Materials Situation and Outlook Report,* IUS-1. Economic Research Service, U.S. Dept. Agr., June 1993, pp. 15-22.

Glauber, Joseph W., Joy L. Harwood, and Jerry R. Skees. *An Alternative for Reducing Federal Crop Insurance Losses.* AER-668. Economic Research Service, U.S. Dept. Agr., May 1993.

Helgeson, Delmer L., David W. Cobia, Randall C. Coon, Wallace C. Hardie, LeRoy W. Schaffner, and Donald F. Scott. *The Economic Feasibility of Establishing Oil Sunflower Processing Plants in North Dakota.* Bulletin 503. Agricultural Experiment Station, North Dakota State University, Apr. 1977.

Kleingartner, Larry. "Sunflower Markets: A Function of Government Production Policy and Oil Export Programs," *Proceedings from the 65th Agricultural Outlook Conference,* Washington, DC, Nov. 1988, pp. 417-419.

Knowles, P.F. "Morphology and Anatomy," *Sunflower Science and Technology.* Ed. Jack F. Carter. American Society of Agronomy, Number 19. Madison, WI, 1978, pp. 55-84.

Lilleboe, Don. "Flowers Complement Rotation of National Soybean Leader," *Sunflower.* National Sunflower Institute, April/May 1990a, pp. 9-11.

_____. "More Red River Valley Acres in '90?" *Sunflower.* National Sunflower Institute, Jan. 1990b, pp. 13-15.

Marx, George. "Feeding Whole Sunflowerseeds to Dairy Cattle," *The Sunflower*, Vol. 17, No. 4, Apr./May 1991.

McBride, William D. *Characteristics and Production Costs of U.S. Soybean Farms, 1986.* AIB-623. Economic Research Service, U.S. Dept. Agr., Apr. 1991.

_____. *Characteristics and Production Costs of U.S. Soybean Farms, 1990.* AIB-658. Economic Research Service, U.S. Dept. Agr., Oct. 1992.

_____. "Conventional and Conservation Tillage Systems in Soybean Production, 1990," *Oil Crops Situation and Outlook Report.* OCS-33. Economic Research Service, U.S. Dept. Agr., Apr. 1992.

_____. "The Farm Operator Account: An Alternative Measurement of Farm Enterprise Costs and Returns," *Agriculture Income and Finance Situation and Outlook Report.* AIS-53. Economic Research Service, U.S. Dept. Agr., June 1994.

McCormick, Ian, and Bengt Hyberg. "Sunflower Acreage Response to Increased Commodity Program Flexibility," *Oil Crops: Situation and Outlook Report.* OCS-28. Economic Research Service, U.S. Dept. Agr., Jan. 1991.

McCormick, Ian, Cecil Davinson, and Roger Hoskin. *The U.S. Sunflower Industry.* AER-663. Economic Research Service, U.S. Dept. Agr., Oct. 1992.

McElroy, Robert, Mir Ali, Robert Dismukes, and Annette Clauson. *Costs of Production for Major U.S. Crops, 1975-1987.* Staff Report AGES 89-22. Economic Research Service, U.S. Dept. Agr., May 1989.

McKinnell, Cathy, and Nydia R. Suarez. "Export Programs for Vegetable Oils," *Oil Crops: Situation and Outlook Report.* OCS-27. Economic Research Service, U.S. Dept. Agr., Oct. 1990.

McMullen, Marcia P. (ed.). *Sunflower Production and Pest Management.* Extension Bulletin 25 (rev.). North Dakota State University, Dec. 1985.

The Miller Publishing Co. "Ingredient Analysis Table, 1991 edition," *Feedstuffs.* Vol. 63, No. 29, July 18, 1991, pp. 28-30.

Morgan, Nancy. "U.S. Vegetable Oil Export Price Subsidies—What Now?" *Oil Crops: Situation and Outlook Report.* OCS-40. Economic Research Service, U.S. Dept. Agr., Jan. 1994, pp. 16-17.

National Sunflower Association. "Boost Your Cash Flow with Sunflower Power," *Sunflower.* Feb. 1990.

_____. *1990 U.S. Sunflower Crop Quality Report.* Bismark, ND, 1991.

_____. *Sunflower Oil Processing.* Bismark, ND, 1985.

Normile, Mary Anne. "Oilseeds," *Western Europe Agriculture and Trade Report.* RS-89-2 and RS-90-4. Economic Research Service, U.S. Dept. Agr., July 1989 and Nov. 1990.

Olson, Barry M., and Daniel L. Zink. *North Dakota Grain and Oilseed Transportation Statistics.* UGPTI Pub. No. 83, Upper Great Plains Transportation Institute, Fargo, ND, Dec. 1990.

Putt, Eric D. "History and Present World Status," *Sunflower Science and Technology.* Number 19. Ed. Jack F. Carter. Madison, WI: American Society of Agronomy, 1978, pp. 1-25.

Reeves, J.B., and J.L. Weihrauch. *Composition of Foods.* AH-8-4. U.S. Department of Agriculture, 1979.

Robbinson, R.G. "Production and Culture," *Sunflower Science and Technology.* Number 19. Ed. Jack F. Carter. Madison, WI: American Society of Agronomy, 1978, pp. 89-144.

Schaub, James, W.C. McArthur, Duane Hacklander, Joseph Glauber, Mack Leath, and Harry Doty. *The U.S. Soybean Industry.* AER-598. Economic Research Service, U.S. Dept. Agr., May 1988.

Scheithauer, R., and K. Dripchak. *Economics of Vegetable Oil Processing*, Oak Ridge, TN: Oak Ridge National Laboratory, 1985.

Schingoethe, O.J. "Sunflowers Dairy Application," *Feed Management*, Vol. 32(G) 1984, p. 18.

_____. "Sunflower Products in Cattle Rations," *The Sunflower*, Vol. 10, No. 5, June/July 1984.

Simpson, Beryl Brintall, and Molly Conner Ogorzaly. *Economic Botany: Plants in Our World.* New York: McGraw-Hill, 1986, pp. 309-11.

United Nations. "Commodity Trade Statistics," Dept. of International Economic and Social Affairs, Statistical Office, Statistical Papers, Series D, 1962-89.

U.S. Department of Agriculture. *Agricultural Statistics*. Various issues.

U.S. Department of Agriculture, Economic Research Service. *Costs of Production: Major Field Crops, 1988*. ECIFS 8-4. Apr. 1990.

_____. *Costs of Production: Major Field Crops, 1989*. ECIFS 9-5. Apr. 1991.

_____. *Oil Crops: Situation and Outlook Report*. Quarterly issues, 1977-93.

_____. *Provisions of the Food, Agriculture, Conservation, and Trade Act of 1990*. AIB-624. Economic Research Service, U.S. Dept. Agr., June 1991.

U.S. Department of Agriculture, Foreign Agricultural Service, Oilseeds and Products Division. Production, Supply, and Distribution Database, July 1991.

_____. *World Oilseed Situation and Outlook*. Various issues, 1979-91.

U.S. Department of Agriculture. *Crop Production*. National Agricultural Statistics Service. Annual and monthly issues, 1962-92.

U.S. Department of Agriculture. *Effects of the Uruguay Round Agreement on U.S. Agricultural Commodities*, Office of Economics, GATT-1, March 1994.

U.S. Department of Agriculture. *Long-term Agricultural Baseline Projections, 1995-2005*, World Agricultural Outlook Board. Staff Report No. WAOB-95-1, Feb. 1995.

U.S. Department of Commerce, Bureau of the Census. *1992 Census of Agriculture*. Geographic Area Series, Vol. 1, Nov. 1994.

U.S. Department of Commerce, Bureau of the Census. *1987 Census of Agriculture*. Geographic Area Series, Vol. 1, Nov. 1989.

U.S. Department of the Interior, Fish and Wildlife Service. *1985 National Survey of Fishing, Hunting, and Wildlife Associated Recreation*. Nov. 1988.

U.S. International Trade Commission. *Harmonized Tariff Schedule of the United States (1992)*. USITC Pub. 2449. U.S. GPO, Washington, DC, Nov. 1, 1991.

Weber, J. Alan. "The Feasibility of Producing Biodiesel in the United States Using a Community-Based Facility," *Industrial Uses of Agricultural Materials Situation and Outlook Report*, IUS-2, Dec. 1993, pp. 30-34.

Weiss, Theodore J. *Food Oils and Their Uses*. 2nd ed. Westport, CT: AVI Publishing Co., 1983.

Appendix table 1--Soybeans: Acreage planted, harvested, yield, production, and value, 1965-94

Year	Planted	Harvested	Yield	Production	Value
	--- 1,000 acres ---		Bushels per acre	1,000 bushels	1,000 dollars
1965	35,227	34,449	24.5	845,608	2,151,305
1966	37,294	36,546	25.4	928,481	2,553,612
1967	40,819	39,805	24.5	976,439	2,433,519
1968	42,265	41,391	26.7	1,106,958	2,688,571
1969	42,534	41,337	27.4	1,133,120	2,664,204
1970	43,082	42,249	26.7	1,127,100	3,214,710
1971	43,476	42,705	27.5	1,176,101	3,559,708
1972	46,866	45,683	27.8	1,270,608	5,550,459
1973	56,549	55,667	27.8	1,547,543	8,786,680
1974	52,479	51,341	23.7	1,216,287	8,069,585
1975	54,590	53,617	28.9	1,548,344	7,617,984
1976	50,269	49,401	26.1	1,288,608	8,768,979
1977	58,978	57,830	30.6	1,767,267	9,362,997
1978	64,708	63,663	29.4	1,868,754	12,449,679
1979	71,411	70,343	32.1	2,260,665	14,203,660
1980	69,930	67,813	26.5	1,797,543	13,601,112
1981	67,543	66,163	30.1	2,000,145	12,004,638
1982	70,884	69,442	31.5	2,190,297	12,462,779
1983	63,779	62,525	26.2	1,635,772	12,774,974
1984	67,755	66,113	28.1	1,860,863	10,748,050
1985	63,145	61,599	34.1	2,099,056	10,571,324
1986	60,405	58,312	33.3	1,942,558	9,262,746
1987	58,180	57,172	33.9	1,937,722	11,391,000
1988	58,840	57,373	27.0	1,548,841	11,487,742
1989	60,820	59,538	32.3	1,923,666	10,916,145
1990	57,795	56,512	34.1	1,925,947	11,042,010
1991	59,180	58,011	34.2	1,986,539	11,091,996
1992	59,180	58,233	37.6	2,190,354	12,167,564
1993	60,135	57,347	32.6	1,870,958	11,949,633
1994	61,940	61,129	41.9	2,558,317	13,785,353

Appendix table 2--Soybeans: Supply, disappearance, and price, 1965-94

Year beginning September 1	Supply			Disappearance					Average price received by farmers
	Beginning stocks	Production	Total[1]	Crush	Exports	Seed, feed, and residual	Total	Ending stocks	
	Million bushels								Dollars per bushel
1965	30	846	876	537	251	52	840	36	2.54
1966	36	928	964	559	262	53	874	90	2.75
1967	90	976	1,066	576	267	57	900	166	2.49
1968	166	1,107	1,273	606	287	53	946	327	2.43
1969	327	1,131	1,458	737	433	58	1,228	230	2.35
1970	230	1,127	1,357	760	434	64	1,258	99	2.85
1971	99	1,176	1,275	721	417	65	1,203	72	3.03
1972	72	1,201	1,273	722	479	12	1,213	60	4.37
1973	60	1,548	1,608	821	539	77	1,437	171	5.68
1974	171	1,216	1,387	701	421	77	1,199	188	6.64
1975	188	1,549	1,736	865	555	71	1,491	245	4.92
1976	245	1,289	1,534	790	564	77	1,431	103	6.81
1977	103	1,767	1,870	927	700	82	1,709	161	5.88
1978	161	1,869	2,030	1,018	739	97	1,854	176	6.66
1979	176	2,261	2,437	1,123	875	81	2,079	358	6.28
1980	358	1,798	2,156	1,020	724	99	1,843	313	7.57
1981	313	1,989	2,302	1,030	929	89	2,048	254	6.04
1982	254	2,190	2,444	1,108	905	86	2,099	345	5.67
1983	345	1,636	1,981	983	743	79	1,805	176	7.83
1984	176	1,861	2,037	1,030	598	93	1,721	316	5.84
1985	316	2,099	2,415	1,053	740	86	1,879	536	5.05
1986	536	1,940	2,479	1,179	757	106	2,042	436	4.78
1987	436	1,938	2,375	1,174	802	97	2,073	302	5.88
1988	302	1,549	1,855	1,058	527	88	1,673	182	7.42
1989	182	1,924	2,109	1,146	623	101	1,870	239	5.69
1990	239	1,926	2,168	1,187	557	95	1,839	329	5.74
1991	329	1,987	2,319	1,254	684	103	2,041	278	5.58
1992	278	2,190	2,471	1,279	770	130	2,179	292	5.56
1993	292	1,871	2,170	1,272	589	100	1,961	209	6.40
1994[2]	209	2,558	2,775	1,360	790	115	2,265	510	5.20-5.50

[1] Includes imports.
[2] Preliminary.

Appendix table 3--Soybean meal: Supply, disappearance, and price, 1965-90

Year beginning October 1	Supply			Disappearance			Ending stocks 1/	Price of 48-percent protein, Decatur (solvent)
	Beginning stocks[1]	Production	Total[2]	Exports	Domestic	Total		
	1,000 short tons							Dollars per ton
1965	106	12,901	13,007	2,601	10,274	12,875	132	81.46
1966	132	13,483	13,615	2,657	10,820	13,477	138	78.83
1967	138	13,660	13,798	2,900	10,753	13,653	145	76.93
1968	145	14,581	14,726	3,044	11,525	14,569	157	74.12
1969	157	17,597	17,754	4,036	13,581	17,617	137	78.45
1970	137	18,035	18,172	4,559	13,467	18,026	146	78.51
1971	146	17,024	17,170	3,085	13,173	16,978	192	90.20
1972	192	16,709	16,901	4,558	12,160	16,718	183	228.99
1973	183	19,674	19,857	5,558	13,792	19,350	507	146.35
1974	507	16,702	17,209	4,299	12,552	16,851	358	130.86
1975	358	20,754	21,112	5,145	15,612	20,757	355	157.68
1976	355	18,488	18,843	4,559	14,056	18,615	228	218.73
1977	228	22,371	22,599	6,080	16,276	22,356	243	179.45
1978	243	24,354	24,597	6,610	17,720	24,330	267	206.18
1979	267	27,105	27,372	7,932	19,214	27,146	226	197.05
1980	226	24,312	24,538	6,784	17,591	24,375	163	235.13
1981	163	24,634	24,797	6,908	17,714	24,622	175	196.62
1982	175	26,714	26,889	7,109	19,306	26,415	474	200.94
1983	474	22,756	23,230	5,360	17,615	22,975	255	203.21
1984	255	24,529	24,784	4,917	19,480	24,397	387	136.40
1985	387	24,951	25,338	6,036	19,090	25,126	212	166.20
1986	212	27,758	27,970	7,343	20,387	27,730	240	177.31
1987	240	28,060	28,300	6,824	21,323	28,147	153	239.35
1988	153	24,943	25,100	5,442	19,498	24,940	173	252.40
1989	173	27,719	27,928	5,319	22,291	27,610	318	186.48
1990	318	28,325	28,688	5,469	22,934	28,403	285	181.40
1991	285	29,831	30,183	6,945	23,008	29,953	230	189.20
1992	230	30,364	30,687	6,232	24,251	30,483	204	193.75
1993	204	30,417	30,691	5,356	25,185	30,541	150	193.00
1994[3]	150	32,265	32,475	5,825	26,350	32,175	300	165.00

[1] Includes millfeed (hull meal).
[2] Includes imports.
[3] Preliminary.

Appendix table 4--Major oilseeds: World supply and use, 1990-93

Item	1990/91	1991/92	1992/93	1993/94[1]
		Million metric tons		
Production:				
Soybean	104.14	107.38	117.11	116.60
Cottonseed	33.42	36.62	31.61	29.49
Peanut	22.12	22.24	23.05	23.97
Sunflowerseed	22.84	21.84	21.32	20.98
Rapeseed	25.11	28.27	25.33	26.79
Copra	4.76	4.73	4.84	4.82
Palm kernel	3.32	3.41	4.00	4.26
Total	215.71	224.49	227.26	226.92
Exports:				
Soybean	25.38	28.46	29.59	28.07
Cottonseed	0.34	0.45	0.57	0.49
Peanut	1.34	1.37	1.34	1.34
Sunflowerseed	1.98	2.21	1.91	1.98
Rapeseed	4.00	4.80	4.00	4.96
Copra	0.28	0.24	0.23	0.22
Palm kernel	0.06	0.06	0.06	0.07
Total	33.37	37.59	37.69	37.13
Imports:				
Soybean	25.72	29.12	29.99	28.50
Cottonseed	0.37	0.51	0.67	0.55
Peanut	1.39	1.38	1.31	1.34
Sunflowerseed	1.90	2.44	1.94	2.02
Rapeseed	4.55	4.69	4.03	4.91
Copra	0.26	0.22	0.22	0.22
Palm kernel	0.06	0.05	0.06	0.06
Total	34.26	38.41	38.22	37.60
Crush:				
Soybean	87.33	92.25	96.16	99.71
Cottonseed	25.89	28.64	24.85	22.77
Peanut	11.81	11.78	12.52	12.74
Sunflowerseed	19.87	19.03	18.49	17.78
Rapeseed	23.66	25.50	22.86	24.69
Copra	4.77	4.61	4.82	4.80
Palm kernel	3.28	3.37	3.87	4.28
Total	176.61	185.19	183.56	186.86

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

[1] Preliminary.

Source: U.S. Department of Agriculture, Foreign Agriculture Service, Oilseeds: World Markets and Trade, FOP 12-94, December 1994.

Appendix table 5--Major protein meals: World supply and use, 1990-93

Item	1990/91	1991/92	1992/93	1993/94[1]
		Million metric tons		
Production:				
Soybean	69.50	73.08	75.78	78.88
Cottonseed	12.23	13.32	11.46	10.63
Rapeseed	14.40	15.62	14.05	15.14
Sunflowerseed	8.88	8.63	8.28	8.01
Fish	5.98	6.28	5.91	6.24
Peanut	4.81	4.79	5.10	5.17
Copra	1.66	1.57	1.61	1.62
Palm kernel	1.72	1.75	2.04	2.25
Total	119.16	125.03	124.24	127.94
Exports:				
Soybean	26.89	28.67	27.38	29.33
Cottonseed	2.46	2.30	2.40	2.07
Rapeseed	2.57	3.36	3.27	3.00
Sunflowerseed	2.34	2.29	1.80	1.97
Fish	3.19	3.46	3.33	3.90
Peanut	0.72	0.71	0.65	0.85
Copra	1.20	0.91	1.03	0.98
Palm kernel	1.33	1.47	1.79	1.80
Total	40.69	43.18	41.65	43.90
Imports:				
Soybean	27.17	28.31	27.00	28.65
Cottonseed	2.46	2.50	2.30	2.28
Rapeseed	2.57	3.49	3.41	3.24
Sunflowerseed	2.22	2.36	2.16	1.95
Fish	3.46	3.45	3.87	3.72
Peanut	0.77	0.74	0.72	0.70
Copra	1.22	0.91	0.89	0.86
Palm kernel	1.44	1.48	1.67	1.70
Total	41.31	43.23	42.02	43.10
Consumption:				
Soybean	70.09	73.26	74.75	78.68
Cottonseed	12.27	13.54	11.40	10.83
Rapeseed	14.50	15.65	14.18	15.37
Sunflowerseed	8.73	8.72	8.62	7.98
Fish	6.30	6.30	6.17	6.05
Peanut	4.85	4.81	5.17	5.03
Copra	1.75	1.53	1.48	1.47
Palm kernel	1.74	1.81	2.01	2.11
Total	120.22	125.62	123.78	127.52

[1] Preliminary. Note: Trade and consumption are aggregated using individual marketing years, except Argentina and Brazil, which are adjusted to an Oct.-Sept. year. Source: U.S. Department of Agriculture, Foreign Agriculture Service, Oilseeds: World Markets and Trade, FOP 12-94, December 1994.

Appendix table 6--Major vegetable and marine oils: World supply and use, 1990-93

Item	1990/91	1991/92	1992/93	1993/94[1]
		Million metric tons		
Production:				
Soybean	15.93	16.89	17.10	17.94
Palm	11.09	11.50	13.01	13.41
Sunflowerseed	7.89	7.69	7.37	7.16
Rapeseed	8.65	9.32	8.41	9.17
Cottonseed	3.79	4.18	3.59	3.35
Peanut	3.38	3.38	3.60	3.60
Coconut	2.99	2.92	3.04	3.02
Olive	1.50	2.14	1.78	1.61
Fish	1.39	1.11	1.19	1.22
Palm kernel	1.47	1.49	1.74	1.89
Total	58.06	60.60	60.82	62.38
Exports:				
Soybean	3.63	4.29	4.24	4.97
Palm	7.70	7.68	8.42	9.21
Sunflowerseed	2.53	2.68	2.20	2.05
Rapeseed	1.90	2.09	1.65	1.79
Cottonseed	0.55	0.49	0.35	0.39
Peanut	0.30	0.32	0.23	0.32
Coconut	1.58	1.47	1.69	1.42
Olive	0.72	0.56	0.57	0.63
Fish	0.75	0.62	0.70	0.69
Palm kernel	0.88	0.88	0.92	0.89
Total	20.54	21.07	20.98	22.36
Imports:				
Soybean	3.67	3.86	4.04	4.85
Palm	7.70	7.67	8.09	9.21
Sunflowerseed	2.69	2.69	2.29	2.28
Rapeseed	1.84	2.16	1.71	1.81
Cottonseed	0.55	0.53	0.44	0.42
Peanut	0.32	0.30	0.31	0.29
Coconut	1.45	1.32	1.41	1.34
Olive	0.80	0.67	0.70	0.71
Fish	0.69	0.59	0.60	0.58
Palm kernel	0.81	0.82	0.73	0.75
Total	20.52	20.61	20.32	22.23
Consumption:				
Soybean	15.83	16.00	17.24	18.34
Palm	11.39	11.44	12.40	13.66
Sunflowerseed	7.98	7.77	7.59	7.41
Rapeseed	8.74	9.35	8.55	9.20
Cottonseed	3.78	4.24	3.69	3.37
Peanut	3.39	3.35	3.69	3.60
Coconut	2.98	2.84	2.83	2.90
Olive	1.80	1.86	1.94	1.96
Fish	1.31	1.11	1.11	1.14
Palm kernel	1.40	1.45	1.56	1.80
Total	58.60	59.40	60.60	63.38

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

[1] Preliminary.

Source: U.S. Department of Agriculture, Foreign Agriculture Service, Oilseeds: World Markets and Trade, FOP 12-94, December 1994.