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Feed Grains Backgrounder

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Abstract

The U.S. feed grain sector, largest of the major U.S. field crops, faces unprecedented demand conditions. The size and speed of the expanding use of corn by the ethanol industry is raising widespread issues throughout the U.S. agricultural sector. Debate is ongoing over the use of grain for fuel instead of for food or feed and the adequacy of future grain supplies. Increased productivity (yield) and additional area from land planted to competing crops, land enrolled in conservation programs, or idled land is expected to provide an increased supply of feed grains. In 2003, U.S. feed grain farms had an average annual net cash income of $45,916, compared with $8,875 for nonfeed grain farms. Average household income for feed grain operators in 2003 was $69,034, 17 percent greater than the average for all U.S. households. The outlook is for higher feed grain prices, in part, as a result of renewable energy policies and high energy prices, with feed grain prices rising above farm program support levels. During the ongoing farm policy debate, the U.S. feed grain sector faces uncertainty about the future level and type of government support.

Keywords: Feed grains, corn, sorghum, barley, oats, demand, ethanol, supply, prices, trade, household and farm income, government support programs, farm policy.

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Introduction

The U.S. feed grain sector faces unprecedented demand growth as corn's use in ethanol production continues to accelerate. Currently, ethanol contributes a small share to the Nation's transportation fuel supply, but it accounts for an increasing share of U.S. corn production. Thus, high energy prices and current policies are exposing the feed grain sector to economic pressures and risks that need more understanding.

As more of the corn supply is devoted to ethanol production, there are concerns that less will be available for domestic and global livestock feeding. While domestic feed use and exports have long been the major categories of disappearance for U.S. feed grains, proportions are changing: corn use for ethanol is soon expected to exceed use for exports. The livestock sectors will have to cope with higher and more volatile commodity prices, except to the extent that they can use ethanol byproducts (distillers' spent grains) in place of feed grains. Many questions remain concerning the impacts of rising demand for corn on the domestic and global livestock industry and on consumer food prices.

Although the United States enjoys a competitive advantage in corn production, the pace of demand growth is prompting debate about the adequacy of future supplies. In addition to increased productivity (yields), increased corn production is expected to come from additional area. More area is expected to be bid away from land planted to competing crops, land enrolled in USDA's Conservation Reserve Program (CRP), or idled land. However, additional corn area raises questions about the potential environmental effects, including soil erosion and fertilizer runoff. The input, handling, and transportation sectors for both ethanol and corn are facing increasing demands that will stimulate investment, causing further financial upswings for agribusinesses and financial institutions. What are the risks to the agricultural sector of corn's increased use for ethanol?

During the ongoing farm policy debate, stakeholders in the feed grain sector face uncertainty about the future level and type of government support. Traditionally, government programs have provided the U.S. feed grain sector with income support, risk reduction, incentives for environmental stewardship, and demand enhancement. Important issues in the debate include farm program design, domestic market conditions, and Federal budget concerns. Trade policy (World Trade Organization (WTO) negotiations and regional trade agreements), with its market access and domestic support issues, and renewable energy policy will also enter into the discussions.

U.S. Market Background: Ethanol Stimulates Growth

The U.S. feed grain sector—corn, sorghum, barley, and oats—is the largest segment of U.S. field crops, representing nearly one-third of all cash receipts for field and miscellaneous crops, nearly one-third of area planted to principal crops, and about one-tenth of U.S. agricultural export value. The U.S. feed grain sector is facing unprecedented demand conditions for corn. Growing nonagricultural demand for feed grains is stimulated by increased use of corn for ethanol production facilitated, in part, by the Energy Policy Act of 2005 and rising energy prices (see box "Accelerating Ethanol Production Raises Many Significant Issues for U.S. Agriculture"). Although ethanol accounts for only about 3 percent of the transportation fuel supply, corn's use as a feedstock for ethanol production is having a significant impact on feed grain and other agricultural commodity markets. Corn's use for ethanol has more than tripled in 6 years, and continued strong growth appears to be likely. Will the feed grain sector encounter land constraints in meeting this growth in demand? How will the livestock and export markets respond?

While feed use and exports have long been the major source of disappearance for feed grains, the proportions that account for disappearance are changing as corn used for ethanol begins to exceed corn exports. Corn use for ethanol is rising faster than corn use for feed and exports. Direct corn feed use may decline as ethanol byproducts (distillers' spent grains) are partially substituted for corn in livestock rations and grain-consuming animal units decline due to higher grain prices.[1] Corn exports may also decline as higher corn prices curtail global consumption and stimulate global feed grain production. Considerable debate surrounds the prospects for expanded supplies to meet increased corn demand from ethanol production. Yield growth and additional area from competing crops, CRP land, and idled land are expected to contribute to increased corn production. Market forces will allocate the resources used to produce corn or competing crops, and higher prices will trigger demand adjustments among fuel, feed, and food uses. It is also likely that a rapidly expanding ethanol industry will push prices to levels that make marketing loan benefits or counter-cyclical payments highly unlikely as currently structured. Sharply higher prices could place considerable stress on the livestock and poultry industries and food processors. Shifts to more continuous corn production to meet the needs of growing demand also could stress the environment. Policymakers need to understand the impacts of this changing market and its implications for agricultural policy.[2]

U.S. Feed Grain Use Sees Record Prospects

The demand for U.S. feed grains is mostly a derived demand from the production of meat, milk, eggs, sweeteners, and ethanol. This demand has both a domestic and an export component. Economic growth, both domestic and global, indirectly affects feed grain use. Although the growth rate for the U.S. economy is expected to decline over the next several years, this change is not expected to impact consumption and livestock production as

[1]When ethanol is produced from corn, only the starch is used. A variety of highly valuable feed co-products are produced from the remaining protein, fiber, vitamins, and minerals in dry-mill corn processing. The term "distillers' spent grains" refers to co-products generated by dry-grind ethanol plants, including distillers' wet grains, distillers' dried grains, distillers' wet grains with solubles, distillers' dried grains with solubles, and condensed distillers' solubles.

[2]An update of the current feed grain market situation can be found at *http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1273*.

much as the price of grains. Returns to U.S. meat and poultry production are expected to decline in the next several years due to higher grain prices from expansion of corn-based ethanol production, thereby reducing beef and pork production and slowing gains for poultry over the next several years (USDA, WAOB, February 2007). Foreign countries with faster growing economies (especially developing countries) are likely to include more meat and dairy consumption in their diets, which should contribute to growing demands for U.S. feed grains, but this, too, is expected to curtail over the next several years due to the impacts of higher feed grain prices.

Total use of U.S. feed grains is expected to reach record highs over the next several years, supported mostly by corn's use in ethanol, with some decline likely in domestic feed and residual use and corn exports. For 2006/07 and the next several years, feed and residual use is expected to decline somewhat because of high grain prices. Use of byproducts (distillers' spent grains) from ethanol production is expected to meet more of the feed demands by U.S. livestock (particularly beef and dairy cattle) (fig. 1.). Higher corn prices are expected to reduce grain feeding in the next several years beyond 2006/07. Exports of corn are expected to rise slightly in the 2006/07 crop year as global customers continue to purchase feed grains despite higher prices, but continued high prices are expected to cause U.S. exports to decline over the next several years. Food, seed, and industrial (mostly fuel for ethanol) use is expected to be the fastest growing component of feed grain demand, as market conditions in the energy sector stimulate a faster pace of ethanol production than was required by the renewable fuel mandate.

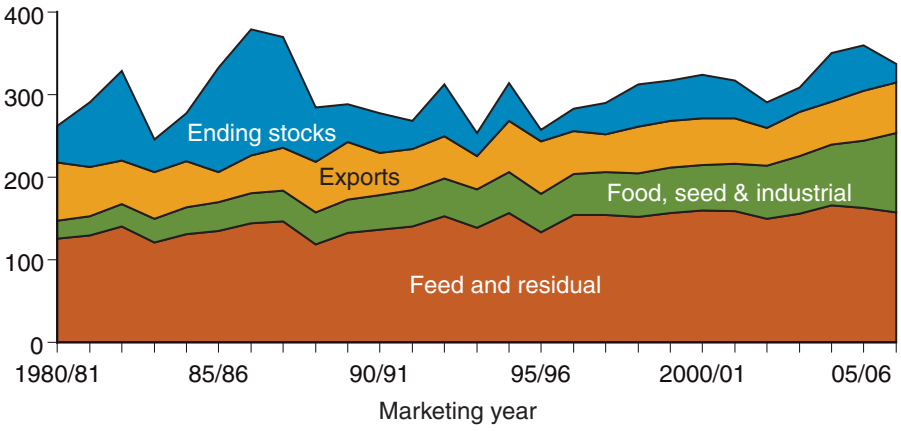
Feed and Residual Use Likely To Decline

As stated earlier, direct feed and residual use of U.S. feed grains is expected to decline somewhat over the next several years as higher feed grain prices

Figure 1

U.S. feed grain use

Mil. metric tons



Source: USDA, Economic Research Service, *Feed Grains Database* at *www.ers.usda.gov/data/feedgrains/*

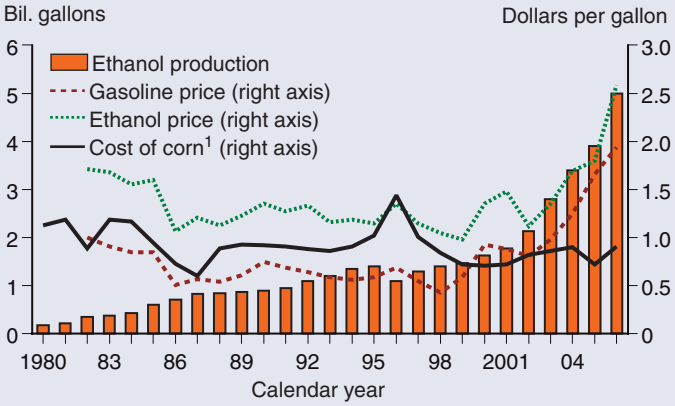
Accelerating Ethanol Production Raises Many Significant Issues for U.S. Agriculture[1]

The size and speed of the increase in corn's use in ethanol production is unprecedented in its effect on the U.S. feed grain market, which is being called on to contribute to the Nation's energy supply (Eidman). Corn's use for U.S. ethanol production rose from 35 million bushels in 1980 to a projected 2.15 billion bushels in 2006/07, as ethanol production expanded from 175 million gallons in 1980 to about 5 billion gallons in 2006 (box fig. 1). Although its production has accelerated in recent years, ethanol accounts for only about 3 percent of the U.S. transportation fuel supply (volume basis), but it accounts for a much larger share of corn production, 20 percent forecast in 2006/07. To further illustrate the rapid rise in ethanol production, USDA's baseline report, *USDA Agricultural Baseline Projections to 2015*, released in February 2006 estimated that about 7.5 billion gallons of ethanol would be produced by 2012/13, largely driven by the Renewable Fuel Standard (RFS) (USDA, WAOB, 2006). However, 1 year later, USDA's long-term projections report, *USDA Agricultural Projections to 2016*, released in February 2007, estimated that about 11.6 billion gallons of ethanol would be produced by 2012/13 (USDA, WAOB, February 2007). Thus, ethanol production is rapidly exceeding the minimal levels required by the RFS. The growth in ethanol's use of corn highlights two key issues:

- The supply of corn is small, compared with the size of U.S. gasoline demand. If the United States is to greatly reduce its dependence on imported oil, other domestic sources of renewable energy must be developed to replace oil.
- The economic importance of increased ethanol production is significant to agriculture, as rising corn prices and increased corn acreage create implications for other agricultural markets.

Box figure 1

Ethanol production compared to prices of gasoline and ethanol and cost of corn



[1]Corn costs are converted to dollars per gallon by dividing the corn price by 2.65, the average (1980-2006) number of gallons of ethanol produced from a bushel of corn.

Sources: Ethanol production is available from the Renewable Fuel Association at www.ethanolrfa.org/industry/statistics/#A, 2006 production is estimated. Gasoline and ethanol prices are annual average of monthly (F.O.B.) rack prices from Nebraska Energy Office, Nebraska Ethanol Board, Lincoln, Nebraska, available at www.neo.ne.gov/statshtml/66.html. Corn prices are annual average of monthly Central Illinois country elevator bids from USDA, Agricultural Marketing Service and available at www.ers.usda.gov/data/feedgrains/.

One recent policy stimulus for ethanol production came from the Energy Policy Act of 2005. Several provisions of the act related to agriculture-based renewable energy production (Government Printing Office).[2] (See "Government Programs Support the Sector: Ranging From Income Support to Demand Enhancement," pg. 27, for more information on other policies stimulating corn use in ethanol production.) The RFS (Sec. 1501) requires that 4.0 billion gallons of renewable fuel be used domestically in 2006, increasing to 7.5 billion gallons by 2012. Most of this fuel will be ethanol, derived mostly from corn, and some will be biodiesel, derived mostly from soybeans. Currently, starch from corn accounts for about 98 percent of the feedstocks used in U.S. ethanol production. In the future, biomass from other sources (e.g., grasses, wood pulp, or crop residue) will need to contribute more of the feedstock for ethanol production.[3]

Factors Affecting Ethanol Production and Prospects for the Longer Term

Ethanol production depends on the interaction of government incentives and policies, technology development, corn prices, ethanol prices, prices of co-products from ethanol production, and prices of oil and other energy substitutes. Several factors have especially contributed to the rapid increase in ethanol production, including strong energy prices, the RFS under the Energy Policy Act of 2005, low corn prices until the fourth quarter of calendar year 2006, the blender tax credit of $0.51 per gallon, the ethanol import duty of $0.54 per gallon, and the elimination of ethanol's main oxygenate competitor, methyl tertiary butyl ether (MTBE) (Collins, 2006). Ethanol's

Continued on page 7

Continued from page 6

production response to selected market signals, such as gasoline price, ethanol price, and cost of corn, is shown in the figure. Note that in 1996, ethanol production declined as the cost of corn rose significantly relative to the price of gasoline and ethanol.

Production cost is another factor that can support or jeopardize ethanol production (Collins, 2006). Ethanol production costs declined between 1980 and 1998 as technology improvements over this period created higher ethanol yields per bushel of corn and costs declined for enzymes used to convert corn into ethanol. Production automation lowered labor costs, and energy costs also fell during this period. Feedstock costs typically account for a major part of total ethanol operating costs. Co-product credits for distillers' grains and carbon dioxide are crucial to controlling ethanol production costs, as they offset feedstock costs. Energy costs rank second in importance of operating costs. Using co-generated power from adjacent power plants or waste coal, landfill gas, or animal waste as a boiler fuel can reduce ethanol production costs. The average cost of producing ethanol (excluding capital costs) was $0.95 per gallon between 1998 and 2002. Since 2002, ethanol production costs increased to $1.45 per gallon, reflecting rising costs of energy (electricity and natural gas) and, more recently, corn (Collins, 2007).

Ethanol production is expected to continue to grow but its growth rate depends on the level of oil prices, ethanol prices, feedstock costs, changes in technology, and changes in government incentives and policies. Although there is optimism in the current ethanol market, there are also risks in the outlook (Collins, 2006). How will the market evolve over time, especially if production exceeds the RFS level? Currently, there is no requirement for ethanol use to exceed 7.5 billion gallons per year by 2012, and ethanol must be competitive in the marketplace for its use to exceed this level. Wholesale ethanol prices averaged $0.57 per gallon above wholesale gasoline prices between 1982 and 2006 (box fig. 1) and were much higher in 2006. This premium, however, could disappear and ethanol could sell at a discount to gasoline, reflecting ethanol's energy content relative to gasoline, as ethanol production expands and exceeds the mandated level of 7.5 billion gallons per year. A combination of declining crude oil prices (gasoline prices), sharply rising corn prices, or a decline in ethanol's premium to gasoline prices could curtail the ethanol production expansion and thereby mitigate pressure on the agriculture sector. However, as mentioned previously, recent estimates point to ethanol production expanding and thus creating more expansion pressure on the agriculture sector.

Agricultural Market Issues of Expanded Ethanol Production

Much debate centers on the ability of the feed grain sector to continue to simultaneously meet the growing demand of energy and other established needs, such as feed and food. Several implications for farm policy to consider may arise as the ethanol industry absorbs a larger share of the corn supply.

1. What are the impacts on corn prices from expanded ethanol production?
2. How much additional acreage can shift into corn production?
3. What will happen to U.S. feed use and exports as more corn is devoted to ethanol production?
4. How will the byproducts from ethanol production be worked into domestic livestock rations?
5. What are the U.S./global feed grain trade and food price effects of increased ethanol production in the United States and other countries?
6. Can existing conservation programs deal with the increased potential for soil erosion?
7. What are the likely impacts on existing grain and feed marketing and transportation infrastructure, including the infrastructure needed for ethanol?
8. Does the ethanol market introduce additional price risk for corn markets and are new or alternative policies needed to address this risk?
9. What will energy policies mean for existing farm programs?

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[1] More information regarding renewable energy is available at *www.usda.gov/oce/energy/*

[2] For a summary of provisions related to agriculture-based renewable energy production, see Schnepf (May 18, 2006), pp. 35-37, or *www.ethanol.org/documents/ACERFSSummary.pdf.*

[3] Biobutanol, an alcohol similar to ethanol, may also play a future role in the biofuel scenario. DuPont and British Petroleum formed a joint venture to produce this new alcohol in the United Kingdom. Biobutanol's characteristics are different from ethanol. It has low vapor pressure and tolerance to water contamination in gasoline blends, which allows it to be used in existing gasoline supply and distribution channels, including blending at the petroleum refinery. Existing U.S. ethanol plants would be retrofitted to produce biobutanol. Potential feedstocks for producing this alcohol include sugar, corn, wheat, and cassava or cellulosic feedstocks, such as grasses, straw, or corn stalks (Howie).

reduce the level of animal feeding. In addition, distillers' spent grains may be used as a substitute source of energy and/or protein to meet livestock feed needs. Despite projections for modest income growth in the United States, domestic and export livestock demand may soften somewhat due to the impacts of higher feed grain prices, in contrast to recent demand growth (fig. 2).

When a bushel of corn is used in the production of ethanol, the entire bushel is accounted for in the fuel alcohol use category because the co-product, distillers' spent grains, is no longer corn, even though it may be substituted for corn and/or protein meal. Distillers' spent grains account for about 30 percent of the original weight of corn, with the remaining 70 percent being accounted for by the ethanol production process.

Questions remain about the volume of corn that distillers' spent grains can realistically replace in the feed supply. There are some limitations to the substitution of co-product feeds for direct corn use. Generally, animal nutritionists recommend a maximum of 25 percent of distillers' dried grains (DDGs) for dairy feed rations on a dry-matter basis and 40 percent DDGs for fed cattle. DDGs work well in beef cattle feeding if used with corn stover. Preliminary research at Iowa State University indicates this combination may allow higher levels of corn replacement with DDGs. However, corn stover may be converted to ethanol in the future, and feedlots in the High Plains do not have a large ready supply of corn stover. Monogastric poultry and hog rations can include up to 5-15 percent DDGs, with the limitation due to the high fiber content of DDGs. Some producers have indicated that feeding at the upper end or in excess of this range can reduce meat quality.[3]

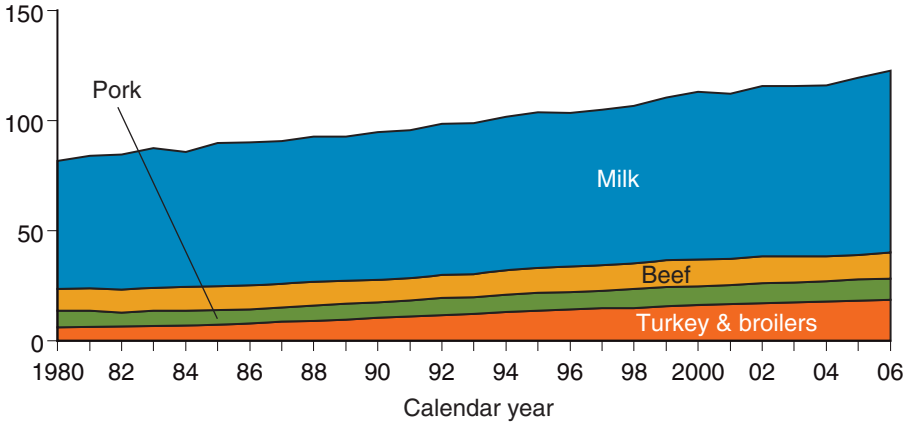
Future technology could further reduce the energy component of feed supplies. Industry is examining technology that removes corn oil from distillers' spent grains. At least one pilot plant is planned to convert oil from corn germ, found in distillers' spent grains, for use in biodiesel. If

[3]Producers will need to test all distillers' dried grains (DDGs) to ascertain their quality and substitutability in the feed ration. Presence of mycotoxins could reduce their use in the ration. The processing of corn into ethanol creates a concentration of mycotoxins in the DDGs at three times their levels found in corn prior to processing.

Figure 2

U.S. production of livestock, poultry, and milk

Mil. metric tons



Source: USDA, Economic Research Service, *USDA Agricultural Agricultural Projections to 2016*, February 2007, at www.ers.usda.gov/briefing/baseline/

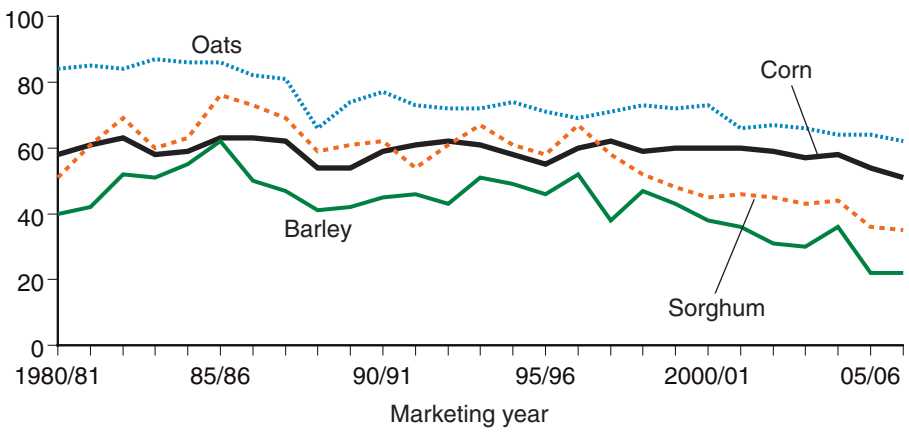
successful, this new technology would alter the feed value of distillers' spent grains and further reduce the supply of feed energy to the livestock and poultry industries. Additionally, the cellulosic conversion process could convert most of the remaining starch and fiber in distillers' spent grains to ethanol. Price would signal whether these products go into fuel or feed.

More understanding is needed on the implications of bioenergy development for U.S. feed and livestock markets (Doering and Hurt). How will byproducts from ethanol production be used in different livestock rations? To what extent will byproducts, especially distillers' spent grains, replace corn and other protein meals and how will markets be affected? How will large volume processing of corn for ethanol affect the relative profitability and risk exposure of the swine and poultry industries versus the beef and dairy industries? The swine and poultry industries are much more limited in their ability to use distillers' spent grains but they are more efficient feed converters. Is there significant risk that these industries may migrate to South America or Eastern Europe? How will biodiesel production (primarily from soybean oil) impact the supply of protein meals?

The shift to increased use of corn in ethanol production has implications for feed and residual's share of total use. This share of corn is expected to continue to decline over the next several years, after having fallen from about 60 percent in the late 1990s to about 51 percent in 2006 (fig. 3). For sorghum, the proportion of feed and residual use is expected to increase slightly over the next several years as feed use rises, offsetting a decline in exports. The share of barley used for feed and residual is the lowest of all the feed grains during the period but is expected to rise somewhat in the next several years relative to malt use and exports. For oats, the feed and residual share is the highest of any feed grain and is expected to rise slightly, as food and export use remain stable.

Figure 3

Proportion of feed and residual use to total use, by type of feed grain



Source: USDA, Economic Research Service, *Feed Grains Database* at *www.ers.usda.gov/data/feedgrains/*

Food, Seed, and Industrial Use Expected To Accelerate

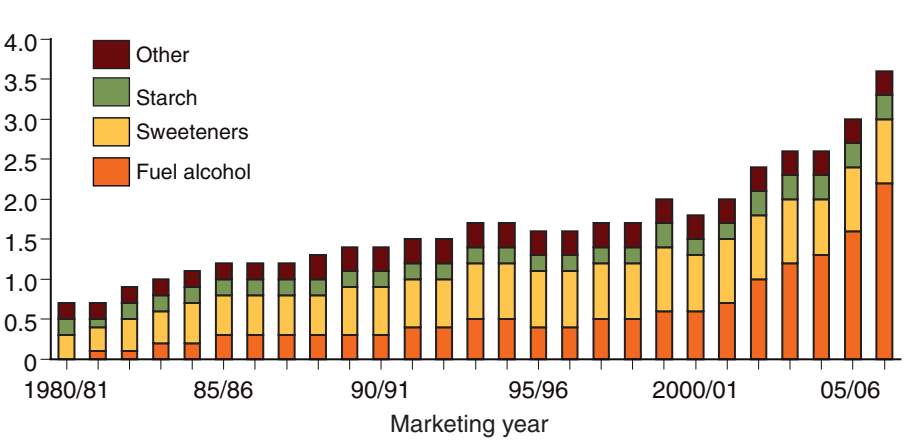
Corn used for producing fuel alcohol has grown sharply since the early 1980s, and fuel alcohol is now the largest component within the food, seed, and industrial (FSI) use category (fig. 4). Corn's use for ethanol is expected to be nearly equal to exports in 2006/07 and is expected to exceed exports in the near future. Gains in corn used for high fructose corn syrup (HFCS) may increase in the next several years because of an agreement reached by the United States and Mexico.[4] Effective on January 1, 2008, the United States will not face duties or quantitative restraints on HFCS exports to Mexico. Gains in corn used in starch may be smaller over the next several years than in the previous decade because it is a mature market and projected gains largely reflect population growth. FSI use of corn for ethanol production is expected to accelerate in the next several years. This increase is attributed to several factors, including the discontinued use of methyl tertiary butyl ether (MTBE) by gasoline refiners, recent high oil prices, and government policies to promote renewable energy (see "Government Programs Support the Sector: Ranging From Income Support to Demand Enhancement," pg. 27 for more information on corn use as a result of renewable energy policies).

The proportion of corn used for FSI (mostly ethanol) is expected to expand over the next several years. This proportion rose from 20 percent in 2000/01 to 30 percent in 2006/07 (fig. 5). Sorghum's use for ethanol is expected to remain fairly constant, as is its FSI share of total sorghum use. Sorghum's contribution to the total ethanol supply is very small as corn is currently the major feedstock used to produce ethanol. In contrast, the FSI share of total use for barley and oats is expected to decline slightly over the next several years. Barley's use for domestic malt beverages is expected to remain fairly constant, and food use for oats will remain constant.

[4]On July 27, 2006, the United States and Mexico announced an agreement on market access for sweeteners.

Figure 4

Corn utilization in food, seed, and industrial

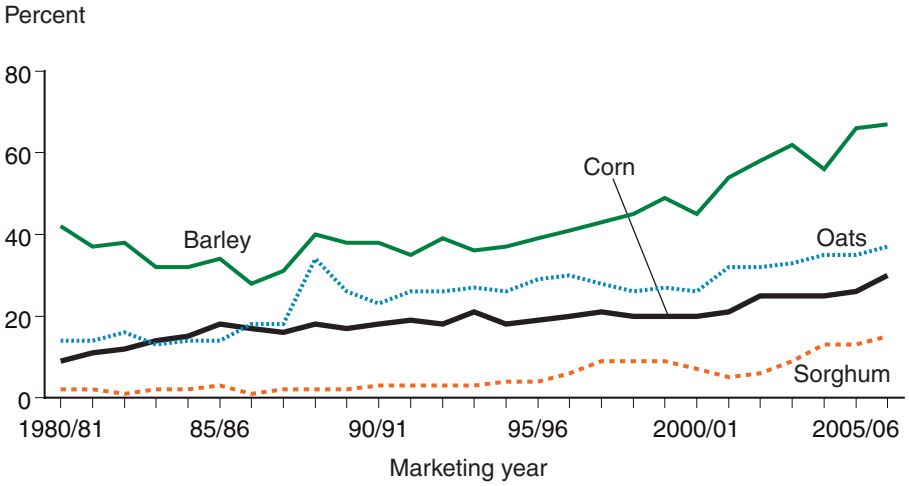


"Other" includes cereals, beverage alcohol, and seed.

Source: USDA, Economic Research Service, *Feed Grains Database* at *www.ers.usda.gov/data/feedgrains/*

Figure 5

Proportion of food, seed, and industrial use to total use, by type of feed grain



Source: USDA, Economic Research Service, *Feed Grains Database* at *www.ers.usda.gov/data/feedgrains/*

U.S. Feed Grain Exports Expected To Decline [5]

Expectations of a strengthening world economy, with an average growth of over 3 percent during the next several years, may raise global demand for feed grains. Although the United States enjoys a competitive advantage in corn production, U.S. corn exports may decline somewhat due to higher corn prices, which may lead to increased global production and a moderation in foreign demand for U.S. feed grains. Livestock sectors for Mexico, North Africa and the Middle East, China, and Southeast Asia have accounted for most of the growth in recent global imports of feed grains and are expected to continue to do so over the next several years (fig. 6). While U.S. corn exports have kept pace with the global coarse grain trade, U.S. ethanol production and global competition are expected to reduce potential U.S. export share in the next several years (fig. 7). What is not clear is the level of future corn exports that will be replaced by distillers' spent grains.

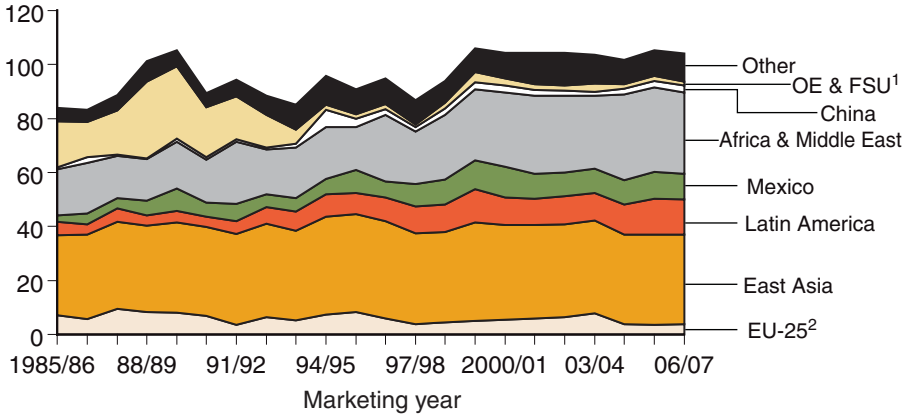
U.S. exports are vital to the sorghum and corn sectors but are of less importance to the barley and oats sectors. U.S. sorghum exports as a percentage of total sorghum use are the highest of all the feed grains, almost 50 percent in recent years (fig. 8). Mexico is the major purchaser of U.S. sorghum because its feeders are accustomed to feeding sorghum and its corn imports have been limited by Mexican Government policies. The U.S. export share of total sorghum use is expected to decline in the next several years as implementation of the North American Free Trade Agreement (NAFTA) is completed and corn becomes the preferred grain when restrictions are eliminated. U.S. barley exports accounted for about 10 percent of total barley use in recent years, and this share is expected to drop slightly in the next several years as exports remain constant. U.S. oat exports are very small and are expected to remain at that level in the next several years, as the United States is a large importer of oats.

[5]Data sources: Data on world feed grain production, consumption, stocks, and trade are available in USDA, Foreign Agricultural Service's *Grain: World Markets and Trade* at *www.fas.usda.gov/grain/circular/2006/05-06/graintoc.htm*. More indepth commodity trade information is available at *www.ers.usda.gov/briefing/agtrade/*

Figure 6

Global coarse grain imports

Mil. metric tons



[1]Former Soviet Union and Other Europe; prior to 1999, includes Czech Republic, Estonia, Hungary, Lativa, Lithuania, Malta, Poland, Slovakia, and Slovenia.

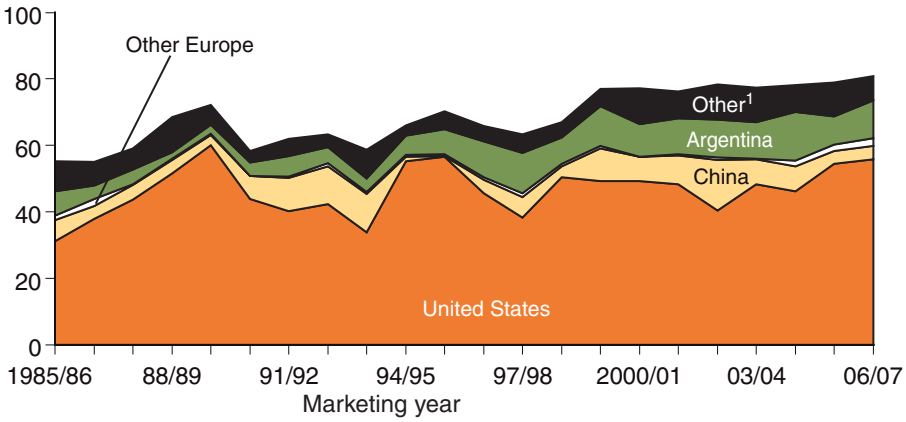
[2]EU-25 excludes intra-trade after 2002, EU-15 intra-trade before 2003, Slovenia before 1992.

Source: USDA, Economic Research Service. *USDA Agricultural Projections to 2016*, February 2007 at www.ers.usda.gov/briefing/baseline/

Figure 7

Global corn exports

Mil. metric tons



[1]Republic of South Africa, Brazil, EU, former Soviet Union, and others.

Source: USDA, Economic Research Service. *USDA Agricultural Projections to 2016*, February 2007 at www.ers.usda.gov/briefing/baseline/

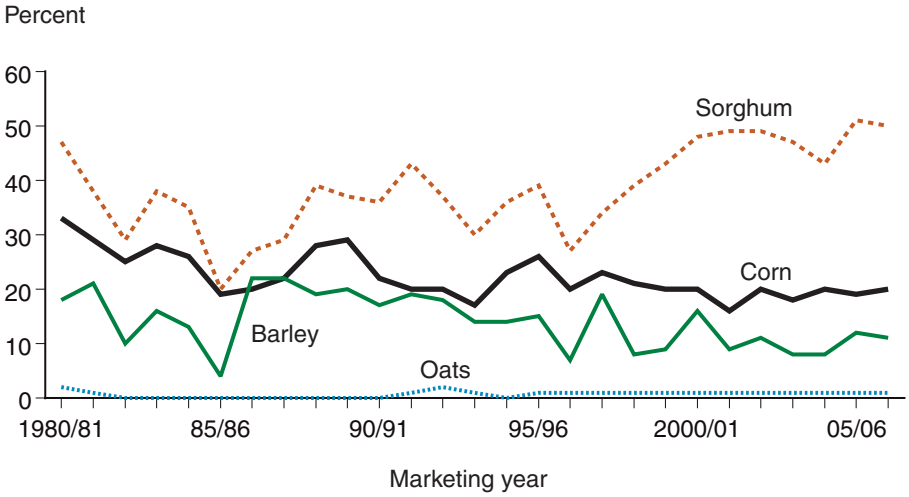
United States Dominates Global Corn and Sorghum Grain Trade

The United States dominates global feed grain trade, especially in corn.[6] The United States is expected to face increased competition from corn exports by non-EU countries in Eastern Europe, the Republic of South Africa, Ukraine, Argentina, and Brazil. China is expected to increase its corn production in response to higher world prices, but increased Chinese demand for livestock feed and ethanol may exceed the production increase and China could become

[6]About two-thirds of global feed grain supplies are used as animal feed, with the remainder going to seed, industrial, and food uses. Industrial uses, such as starch, ethanol, and malt production, are relatively small but growing. Food use of feed grains, concentrated in parts of Latin America, Africa, and Asia, has generally declined over time as consumers tend to shift consumption toward wheat, rice, and other foods as incomes rise. About 10 percent of global feed grain production is traded.

Figure 8

Proportion of U.S. exports to total use, by type of feed grain



Source: USDA, Economic Research Service, *Feed Grains Database* at *www.ers.usda.gov/data/feedgrains/*

a net importer of corn. Increasing meat imports in Japan, South Korea, and Taiwan will likely limit corn imports by these countries. Mexico's corn imports are expected to rise in 2008, reflecting NAFTA's final changes, as corn tariffs are eliminated and sorghum imports decline. Starting in 2008, Mexico's imports of kibbled or cracked corn (processed corn that was tariff free) is expected to be replaced entirely by imports of whole-grain corn.

The United States also dominates global sorghum trade, despite the fact that U.S. exports to Mexico are expected to decline, especially in 2008, when reduced tariffs on corn trade with Mexico may lead to higher U.S. corn exports. Global sorghum trade is expected to remain fairly constant in the next several years despite some adjustments due to NAFTA. Argentina and Australia, two main U.S. competitors, are expected to maintain a fairly constant level of sorghum exports during the next decade.

United States Is Minor Player in Global Barley Trade

Global barley trade is expected to expand in the next several years due to rising demand for both malting and feed barley. Despite these gains, the U.S. share of global barley trade is expected to decline as U.S. exports face increased competition. Globally, most barley exports originate from the EU, Australia, and Canada, but Ukraine and Russia are expected to become important exporters in the global feed barley market in the next several years.

United States Is Leading Global Oats Importer

The United States is the leading global importer of oats and is expected to maintain this position over the next several years. Most U.S. imports of oats

originate in neighboring Canada, the largest global exporter, with other quantities usually originating from Sweden, Finland, and sometimes Australia.

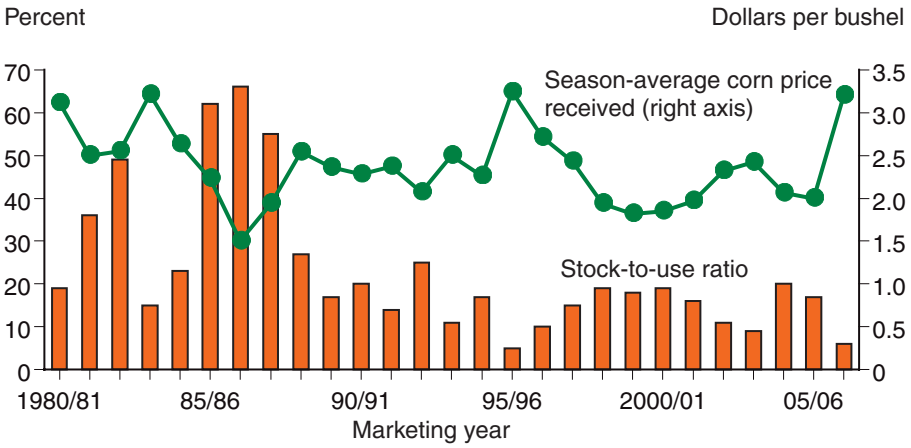
Corn Prices Are Expected To Rise as Ending Stocks Decline

Corn prices are expected to rise significantly in the next several years as U.S. ethanol production is expected to increase. The rise in corn prices will attract additional U.S. area to corn. In 2006/07, approximately 2.15 billion bushels of U.S. corn are expected to be used for ethanol production, representing production from about 14.4 million harvested acres. Assuming ethanol production continues to increase, another 11.4 million harvested acres of corn may be needed to satisfy ethanol's needs by 2010/11, assuming increasing yields in corn production and increasing yields of ethanol per bushel of corn (USDA, WAOB, February 2007, p. 39).

In general, changes in carryover stocks are inversely related to the marketing-year average farm price (Westcott and Hoffman). If total use rises relative to supply, ending stocks decline and farm prices tend to rise. Such relationships are expected to hold with corn over the next several years (fig. 9). Ending stocks of corn have been around 2 billion bushels the past 2 years (2004/05 and 2005/06) due to 2 consecutive years of large production. Consequently, prices have been low, around $2.00 per bushel. Strong demand is expected to draw down these stocks and keep them lower over the next several years. For example, ending stocks for 2006/07 are projected to be less than half the level for 2005/06, and already season-average corn prices received by producers are projected to be more than 50 percent above the 2005/06 season-average price of $2.00 per bushel (USDA, WAOB, February 9, 2007). Current corn futures prices also suggest higher corn prices. For example, as of March 2, 2007, the Chicago Board of Trade settlement price for December 2007 corn was $4.07 per bushel, December 2008 corn was $3.79 per bushel, December 2009 corn was $3.70 per bushel, and December 2010 corn was $3.61 per bushel.

Figure 9

U.S. corn price and stocks-to-use ratio



Source: USDA, Economic Research Service, *Feed Grains Database* at www.ers.usda.gov/data/feedgrains/

However, these expectations need to be qualified. Corn's use in ethanol production has expanded rapidly, due in part to renewable energy policies, but also because of strong energy prices. Corn's use in ethanol production could fall and corn prices could decline if energy prices dropped significantly or if technological breakthroughs in cellulosic conversion allowed lower cost feed stocks to compete with corn in ethanol production.

Ethanol plants will likely raise corn prices in their local market areas, but increased prices for feed corn could be slightly tempered by local availability of distillers' spent grains. Ruminant livestock producers, however, will benefit more from the availability of distillers' spent grains than producers of hogs or poultry. There are significantly more dietary limitations in feeding distillers' spent grains in their current form to monogastric animals. Local corn price effects of ethanol production could increase as the geographic density of plants increases. For example, one study shows that building an ethanol plant increases corn prices at the plant site by an average of 12.5 cents per bushel. This study looked at 12 plant sites with an average annual production capacity of 32.5 million gallons per year. Price impacts at the plant sites ranged from 4.6 cents per bushel to 19.3 cents per bushel (McNew and Griffith).

Feed Grain Supplies To Increase

Considerable debate surrounds the supply response to higher prices resulting from increased corn demand from ethanol production. Will additions to supply come from an increase in yields and/or area? Corn yield growth is expected to account for a portion of the increase in feed grain supplies over the next several years, but if predictions for expanded ethanol production are realized, additional area also will be needed. Corn yields have grown by an annual average of 2 bushels per acre over the last 26 years (1980-2005), and this yield growth is expected to continue. Development of biotechnology varieties may boost this yield growth as some varieties are now resistant to the corn borer and corn root worm, and researchers are working to develop varieties with increased drought tolerability. Research is also being devoted to varieties with increased levels of fermentable starch to enhance their use in ethanol production.

Increasing ethanol sector demand for corn and higher prices will make corn production more attractive relative to competing crops. The resulting increase in corn area is expected to come from area planted to soybeans, with lesser amounts from wheat, cotton, hay, and pasture; CRP land (when contracts expire); and idled land (USDA, WAOB, February 2006, p. 21). Area planted to sorghum, barley, and oats may decline slightly. As more area is devoted to corn production, environmental issues may arise, such as the potential for increased soil erosion and fertilizer pollution in the Nation's streams and rivers, if sound soil management practices are not followed.

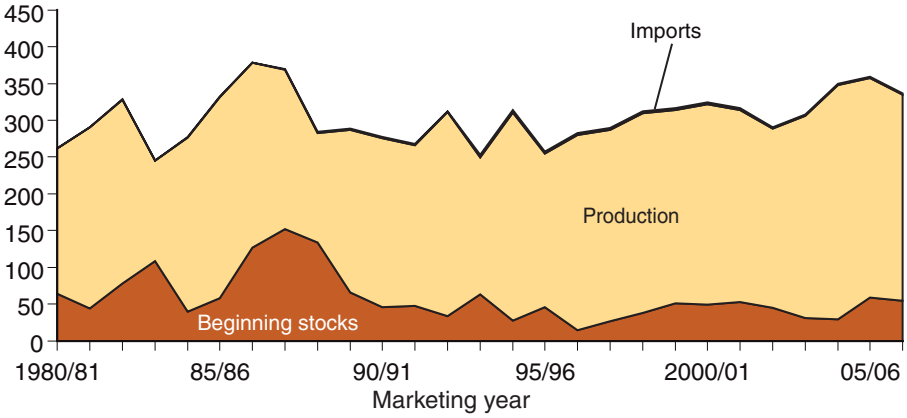
Corn Production Boosts Overall U.S. Feed Grain Supplies

U.S. feed grain supplies trended upward over the period 1980-2006 led mostly by corn production. This trend is expected to continue upward over the next several years (figs. 10, 11). Production of corn rose mostly due to gains in productivity, whereas production of the other feed grains—sorghum, barley, and oats—declined over the period because of minimal gains in productivity and declining area. The reduction of government feed grain stocks in the late 1980s and early 1990s led to lower stock levels, which are expected to continue toward lower free stock levels over the next several years. Feed grain imports have a minor role in total U.S. supply, except for oats imports, where imports account for about 33 percent of U.S. oats supply.

Figure 10

U.S. feed grain supply

Mil. metric tons

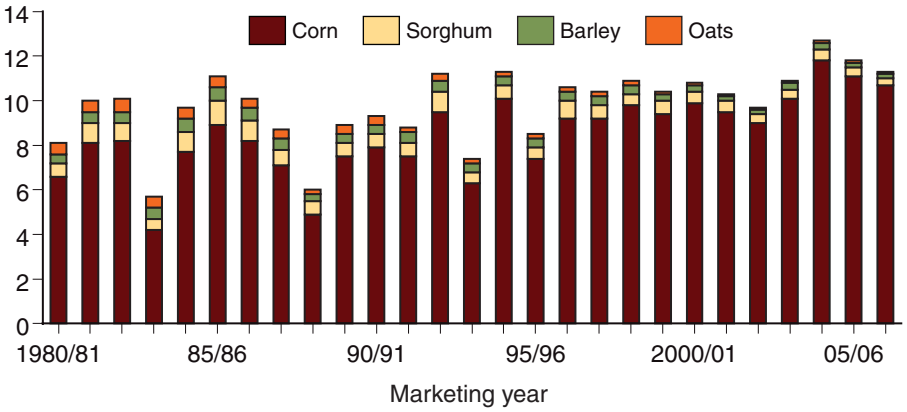


Source: USDA, Economic Research Service, *Feed Grains Database* at *www.ers.usda.gov/data/feedgrains/*

Figure 11

U.S. feed grain production

Bil. bushels



Source: USDA, Economic Research Service, *Feed Grains Database* at *www.ers.usda.gov/data/feedgrains/*

Corn is the largest U.S. feed grain, accounting for 94 percent of total U.S. feed grain production and 85 percent of total area planted to feed grains as of 2005 (figs. 11, 12). The United States is the largest producer of corn in the world, averaging 279.5 million metric tons in 2003/04-2005/06, representing about 41 percent of global production.

Planting Flexibility and Net Returns Facilitate Additional Corn Area

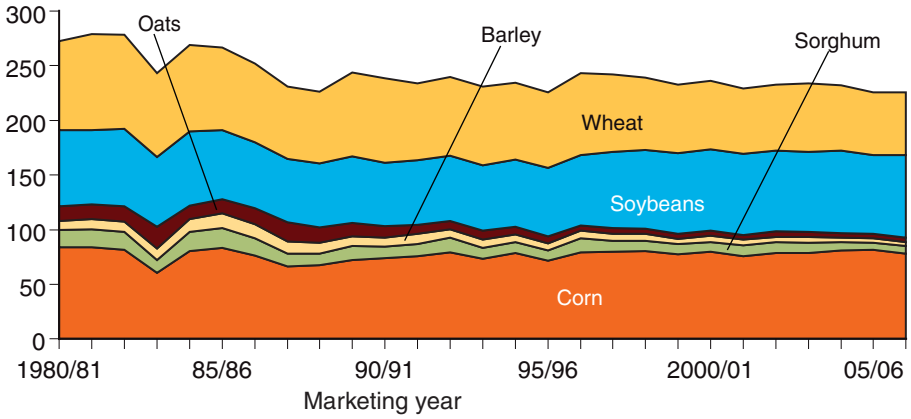
U.S. feed grain area has fluctuated over time due to policy developments, such as acreage reduction programs (ARP) prior to 1996, the Conservation Reserve Program, and planting flexibility provisions, which have been enhanced under successive farm legislation, most notably in 1996. The effects of ARPs that removed acres from production are most notable in 1983-95 (fig. 12). The CRP, initiated with the 1985 Farm Act, also removed feed grain acreage from production, accounting for about 20 percent of the 34.1 million acres enrolled in this program during 1985-87. As of 2005, feed grain acres represent about 23 percent of the 35 million acres in the CRP, based on historical plantings. Planting flexibility provided eligibility for price/income support payments but permitted plantings to differ from base acreage. This flexibility facilitated producers' change in planting mix in response to relative prices and expected marketing loan benefits among crops (Lin et al.). The 1996 Farm Act provided flexibility in planting and allowed farmers to shift from sorghum, barley, oats, and wheat to corn and soybeans (fig. 12) (Young et al., 2005, pp. 4-9).

Over time, U.S. production of corn has increased and the production of other feed grains has decreased because net returns for corn were higher (Baker and Allen, p. 10). Net returns are calculated as the yield multiplied by market price or loan rate plus an estimate of the marketing loan benefits minus variable cost of production. Stronger net returns for corn are attributed mostly to corn yields increasing faster than yields for other crops (fig. 13). The magnitude of the

Figure 12

Planted area for U.S. feed grains, soybeans, and wheat

Mil. acres

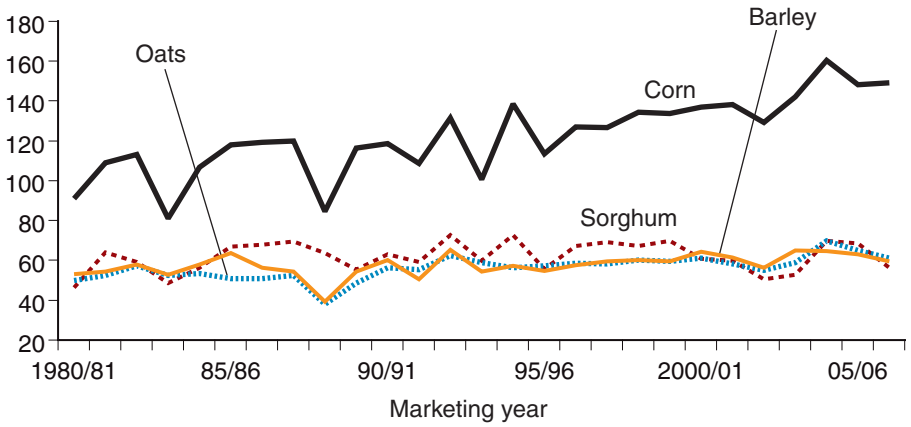


Source: USDA, Economic Research Service, *Feed Grains Database* at *www.ers.usda.gov/data/feedgrains/*

Figure 13

U.S. feed grain yields

Bushel per acre



Source: USDA, Economic Research Service, *Feed Grains Database* at *www.ers.usda.gov/data/feedgrains/*

yield increase is documented by calculating a trend line for each of the feed grains. Regressing yields on years for 1980-2005 gives per year increases of 2.0 bushels for corn (about 1.3 percent), 0.2 bushels for sorghum (about 0.4 percent), 0.5 bushels for barley (about 0.8 percent), and 0.4 bushels for oats (about 0.6 percent).

Many factors affect U.S. yields for feed grains, including climatic conditions, weather, farm management practices, crop variety, and soil type. Trend yields are a good composite indicator of gains related to productivity from production practices, management skills, technology, and input use. In any given year, weather events are crucial and can push yields above or below trend. Major deviations from trend yields may have a significant impact on prices.

Crop biotechnology is an important innovation that can affect yields.[7] Biotech corn is currently designed to be insect resistant and/or herbicide tolerant. Biotech seed with insect resistance does not primarily drive yield but protects underlying yield potential from insect damage. Herbicide resistance in corn has no significant yield effect, but adds convenience and more simplicity to weed control. Some biotech corn hybrids are already available commercially and others are being developed that have specific end-use characteristics desired by consumers, such as increased levels of fermentable starch. Currently, biotech varieties for sorghum, barley, or oats are not available commercially.

Feed Grains Concentrated in North Central United States

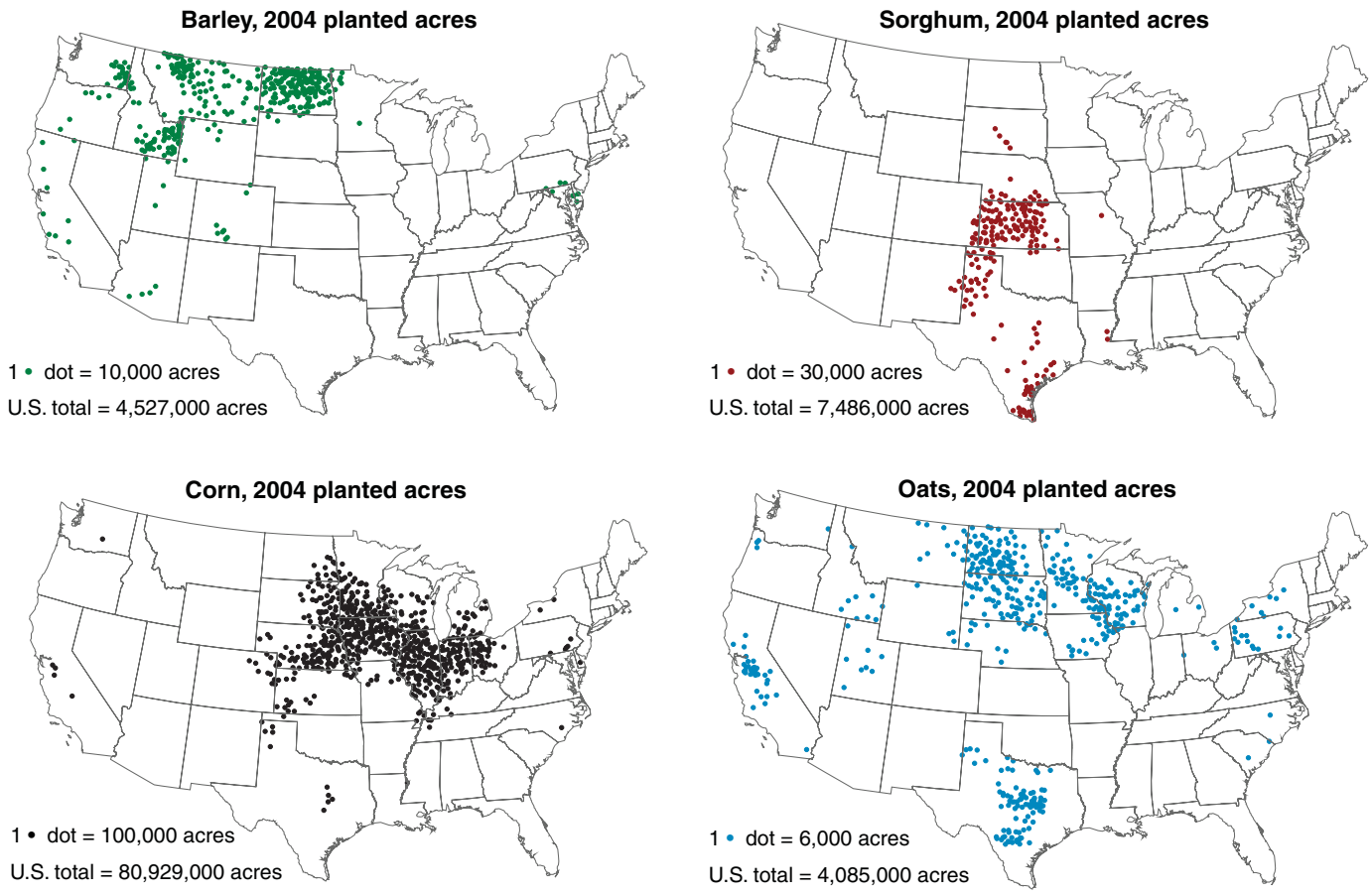
Feed grains are grown throughout the United States, but some areas are better adapted than others to particular grains (fig. 14). The top 10 corn States, in terms of planted area, are located in the North Central United States and account for approximately 80 percent of the total U.S. area planted to corn.[8] Iowa has the most acreage planted to corn, and Illinois has the next highest amount. These two States account for about 30 percent of

[7]Research suggests that genetically engineered (GE) crops do not increase the yield potential of a hybrid variety. However, by resisting pests, GE crops can prevent yield losses associated with non-GE hybrids, especially if pest infestation is high. Prior to Bt corn, insecticides partially controlled the corn borer. Because insecticides were not always economical, many farmers accepted yield losses rather than the added cost of insecticides. For these farmers, Bt corn boosted average yields (Fernandez-Cornejo and Caswell, p. 9). A recent study found average Bt corn yields to be 12.5 bushels higher than yields for conventional corn, a 9-percent increase, in areas where European Corn Borer infestations were heavy (Fernandez-Cornejo and Li). Increased yields are also associated with a recently introduced Bt corn with resistance to the corn rootworm.

[8]The top 10 States are Iowa, Illinois, Nebraska, Minnesota, Indiana, South Dakota, Wisconsin, Kansas, Ohio, and Missouri.

Figure 14

Location of U.S. feed grain production



Source: USDA, Economic Research Service, using data from USDA, National Agricultural Statistics Service, *Quickstats*, March 2006.

U.S. area planted to corn. The share of area in the Northern States is increasing, facilitated by new corn hybrids that are better adapted to shorter growing seasons.

Sorghum is typically grown in regions that experience more droughts because the crop is more tolerant than corn to hot and dry conditions. The top five States producing sorghum are Kansas, Texas, Nebraska, Oklahoma, and South Dakota, as of 2005. Kansas and Nebraska planted nearly three-fourths of all U.S. sorghum acreage in 2005. However, these States appear to be shifting some of their sorghum area into corn production. For example, between 1980 and 2005, the combined sorghum area in Kansas and Nebraska declined by 3.6 million acres, shifting mostly to corn area, which increased by about 2.7 million acres during the period.

Barley is grown throughout the United States, but the largest producing States are North Dakota, Montana, Idaho, and Washington. Barley is a very adaptable crop and has both winter and spring planted varieties. Barley does best in a temperate zone and has a 90-day growing season. In the United States, the largest share of barley is used to make malted beverages—primarily beer and some malt whiskey and malt milk—or malt for use in cereals. Barley that is less suitable to make malt is used as feed. In addition, some barley is grown specifically for feeding. While overall U.S. production of barley has been declining, North Dakota continues to have the largest planted acreage among all States.

Oats are widely planted in the United States, but only about half are harvested for grain. In the South, red oats are planted in the fall and used for small grain pasture. Farther north, oats are planted in the spring as a cover crop for starting forage crops. Some of these plantings are harvested as hay or silage. As a result of these varied uses, State rankings of oat acreage depend on whether acreage is used for planting or harvesting. In 2005, Texas had the largest number of planted oats acres, followed by North Dakota. In the same period, North Dakota had the largest number of harvested oat acres, followed by Wisconsin.

Increased Ethanol Production and New Grain Products Pose Additional Challenges for the Market

Handling of increased supplies of feed grains, distillers' spent grains, and ethanol will pose challenges for the transportation and handling sectors. The development of both biotechnology and nonbiotechnology varieties of grain with value-enhanced attributes could strain the current systems of price discovery, consumer information, health regulation, and trade management.

Transportation and Handling Sectors Are Challenged by Increased Ethanol Production

Increases in ethanol production will place additional demands on a rural transport system that is already strained by peak service demands. In contrast to MTBE, which can be shipped in pipelines, ethanol must be shipped by truck, rail, or barge.[9] Constraints on transportation availability add to shipper costs, which are usually reflected in lower commodity prices to the producer. Capacity constraints are reflected in higher prices for guaranteed car service during peak grain-shipping periods, which again are reflected in lower commodity prices to the producer. Shipping increased amounts of corn and distillers' spent grains will add demand for covered hopper cars, trucks, and barges and possibly drive up rates for using this capacity. Increased ethanol shipments will need additional rail tank cars and locomotives, trucks, and barges capable of carrying ethanol, which may increase the shippers' service costs.

Some country grain elevators may find themselves becoming more of a corn supplier for ethanol plants and distributors of distillers' spent grains and less of a corn supplier for feed mills or export, thereby requiring modifications

[9]Ethanol has high vapor pressure and is subject to water contamination in gasoline blends, thus prohibiting its use in pipelines or blending at a petroleum refinery.

of existing equipment. Grain originations for export may shift to nonethanol market areas or compete more intensely with ethanol and feed users. Some feed firms may find a need to reduce direct corn feeding but increase the use of distillers' spent grains, thus requiring modifications to handling and storage equipment. New uses for contracts will likely emerge to manage these changing needs.

If there is a dramatic increase in corn production in the next several years, demand will increase for onfarm and off-farm grain storing, handling, drying, receiving, and transporting capacity. For example, if a producer switches from a 1-year corn and 1-year soybean rotation to a 2-year corn and 1-year soybean rotation, the volume of corn to be handled will increase both onfarm and off-farm. Under this scenario, some smaller ethanol plants may need to expand their handling and distribution facilities. Such needed investments could challenge both borrowers and the lending industry.

New Grain Attributes Require a Means for Measurement of Value

Value-enhanced grain attributes require measurement through testing or identity preservation systems relying on regulatory oversight based on sound science. For example, life science companies are developing soybeans and corn with modified amino acid profiles designed to address specific market needs. The availability of essential amino acids is a measure of protein quality. If the demand for these products is to grow, the market must be able to measure the value of these new products.

Furthermore, USDA's Grain Inspection, Packers and Stockyards Administration (GIPSA) is standardizing a reference method and rapid tests to determine fermentable starch in corn. Such a test provides an indicator of corn's ability to produce ethanol. Currently, the industry uses two rapid tests based on two different reference methods. By establishing a single standardized reference method for predicting fermentable starch, GIPSA will facilitate the marketing of corn used for ethanol production.

Widespread acceptance of new varieties can be facilitated with better methods of informing consumers and effective management of biotechnology crops and commodities by biotechnology providers, producers, and grain merchandisers. For example, GIPSA established a process verification program to support the increased use of identity preservation and similar marketing mechanisms to meet changing consumer demands. Quality management systems are becoming increasingly important as customers seek more information about noncontent factors, and as more value-enhanced grains enter the market for which rapid tests are not available. Under the program, an organization develops its own quality management system and verification points to meet its customers' demands, add value to the product, and make its business unique among competitors. GIPSA verifies that an organization is measuring up to its own requirements, and passing a verification test permits the company to market its process or product as "USDA Process Verified."

Financial and Operating Characteristics for U.S. Feed Grain Farms

For a more comprehensive picture of the feed grain sector, it is important to examine the financial and operating characteristics of feed grain farms.[10, 11] Data from USDA's 2003 Agricultural Resource Management Survey (ARMS) provide a snapshot of these farms.[12] While the data reflect finances from 2003, it is conceivable that revenue levels may have increased as energy demand continues to influence the feed grain sector. However, the impact of these energy-driven changes on expenses and resulting net farm income remains to be seen, as higher energy prices also raise production expenses.

Feed Grain Farms Generated Higher Net Cash Income Than Nonfeed Grain Farms

In 2003, U.S. feed grain farms had average annual net cash income of $45,916, compared with $8,875 for nonfeed grain farms.[13] The ratio of cash expenses to gross cash income was 75 percent for feed grain farms, compared with 85 percent for nonfeed grain farms (app. table 1). This ratio ranged from 72 percent for sorghum farms to 77 percent for barley farms (app. tables 4-7). This ratio is an efficiency measure with lower values indicating greater efficiency, as lower values indicate that more gross cash income is generated per dollar of cash expenses. Specialized feed grain farms' average net cash income was $38,848, but larger farm sizes of nonspecialized feed grain farms contributed to higher average net cash income of $61,787 per farm (app. table 3).

Government Payments Are Important to Feed Grain Farms

In 2003, government payments accounted for about 8 percent of average gross cash income for feed grain farms, compared with 5 percent for nonfeed grain farms.[14, 15] Changes in government payments are likely to have a greater relative impact on feed grain farms than on nonfeed grain farms. (See "Government Programs Support the Sector: Ranging From Income Support to Demand Enhancement" on page 27 for descriptions of various types of government payments.) Government payments as a percentage of gross cash income ranged from 14 percent for sorghum farms to 8 percent for corn and oat farms (app. tables 4-7). Among feed grain farms, sorghum farms also had the highest percentage of farms receiving government payments, whereas oat farms had the lowest. Sorghum farms had the highest government payments per farm, even though barley farms operated more acres on average and generated higher gross cash incomes than sorghum farms (fig. 15).

Government payments to producers were grouped into four categories: direct payments; counter-cyclical and loan deficiency payments; conservation reserve, wetland reserve, and environmental quality incentives program payments; and other.[16] Direct and other payments accounted for most of the government payments. Direct payments accounted for over half of all

[10]Feed grain farms, defined as those farms harvesting at least 1 acre of corn, oats, barley, or sorghum, accounted for 20 percent of all U.S. farms, or 422,936 farms, in 2003 (app. table 1). The majority of feed grain farms (84 percent) raised corn, while 17 percent grew oats, 7 percent raised barley, and 9 percent grew sorghum. Since farms may raise more than one type of feed grain, the figures do not add to 100 percent. Feed grain farms produced feed grains valued at $24.5 billion in 2003, including the value of feed grains used onfarm.

[11]Specialized feed grain farms derived more than half of their total value of production from feed grains, while nonspecialized feed grain farms derived 50 percent or less of their value of production from feed grains. Value of production excludes the value of grain used onfarm to avoid double-counting the grain's value, once in feed grains and again in livestock. Farm-use-only farms use all the feed grains produced on their farms.

[12]Data for 2003 were used in this analysis because farm income for all farms was not unusually high or low in comparison with recent years.

[13]Nonfeed grain farms are all other farms not growing feed grains.

[14]Government payments as a proportion of gross farm cash income were down in calendar 2003, as stronger corn prices reduced the marketing loan benefits and eliminated counter-cyclical payments.

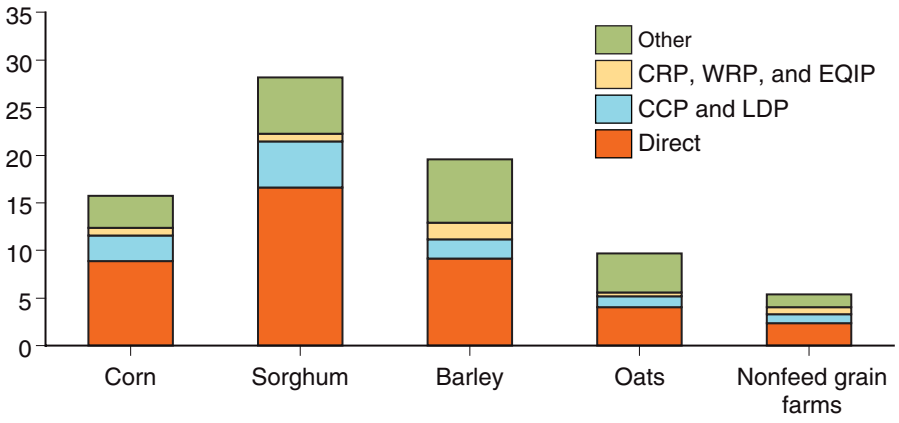
[15]Government payments consist of the following payments: direct, counter-cyclical, loan deficiency, marketing loan gains, net value of commodity certificates, peanut quota buyout, milk income loss contract, agricultural disaster (including disaster assistance and market loss), Conservation Reserve Program, Wetland Reserve Program, Environmental Quality Incentive Program, and other Federal, State, or local government agricultural program payments.

[16]Marketing loan gains and certificate exchange gains were included in the "other" category because of the design of the ARMS questions.

Figure 15

Government payments by type of feed grain farm, 2003

Thousand dollars



Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service, 2003 Agricultural Resource Management Survey.

government payments to corn, sorghum, and barley producers.[17] For oat producers, direct payments accounted for just over 40 percent of all government payments and nearly equaled other government payments. Countercyclical and loan deficiency payments averaged 12 percent of total payments for all feed grain farms, but in years with lower prices a larger share would be expected. Conservation payments accounted for 5 percent of all government payments to feed grain farms.

Impact of Government Payments on Covering Cash Costs

ARMS data for 2003 show that about 70 percent of feed grain farms (71 percent for corn farms) covered cash expenses from gross cash income. Without government payments, 8 percent fewer feed grain farms (8 percent fewer corn farms) would cover their cash costs (fig. 16).[18] Farms can remain in the farming business in the short run as long as their gross cash incomes exceed their cash expenses, but in the longer run they are more likely to remain in the farm business if they can meet all their cash and noncash expenses from gross farm income.

Operating Characteristics[19]

Based on 2003 ARMS data, feed grain farms operate more acres per farm, have higher gross and net incomes per farm, and have higher values of farm equity per farm than nonfeed grain farms (app. table 1). In the same period, feed grain operators were much more likely to list farming as their chief occupation and were more likely than operators of nonfeed grain farms to operate a farm organized as a partnership or family corporation. Feed grain operators were slightly younger on average but had less formal education than nonfeed grain operators. Younger operators typically have more formal education than older operators.

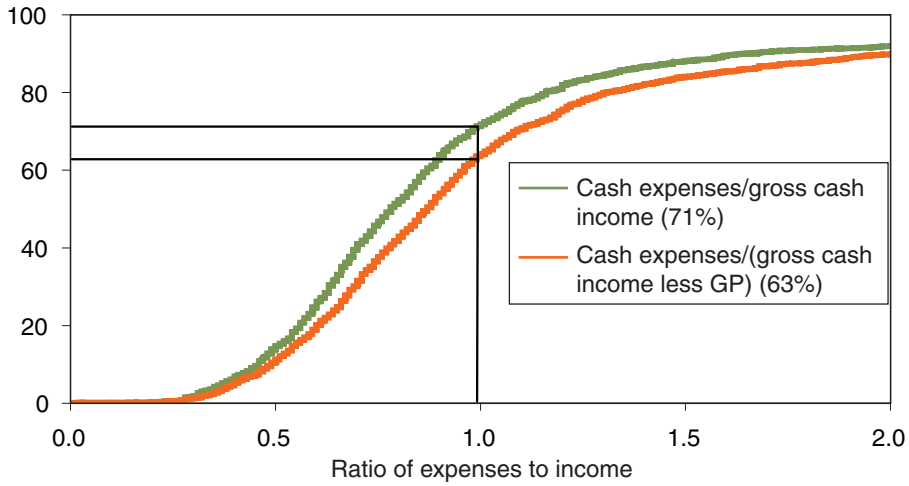
[17]Other government payments consist of marketing loan gains, net value of commodity certificates, government payments received through cooperatives, peanut quota buyouts, milk income loss contract, agricultural disaster, and any other Federal, State, or local government agricultural program payments.

[18]Specialized feed grain farms had about 70 percent of their farms meet or exceed cash expenses, compared with nearly 80 percent of nonspecialized feed grain farms and about 60 percent of farm-use-only farms. Without government payments, 10 percent fewer specialized feed grain farms would be able to cover their cash expenses, compared with 9 percent fewer nonspecialized feed grain farms and 4 percent fewer farm-use-only farms.

[19]See appendix tables 2 and 3 for details.

Figure 16

Cumulative percentage of corn farms by ratio of cash expenses to gross cash income, 2003



GP = Government payments.

Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service, 2003 Agricultural Resource Management Survey.

In 2003, only 29 percent of all feed grain farms specialized in feed grains, but these farms accounted for 51 percent of the value of all feed grain production, including the value of feed grains used on farm. Most of these specialized farms were corn farms. Nonspecialized farms accounted for 45 percent of feed grain farms and produced 43 percent of the value of all feed grains. Farm-use-only farms accounted for 26 percent of the feed grain farms but produced just 6 percent of all feed grains (app. tables 2, 3). (See appendix tables 4-7 for specific information on individual feed grains.)

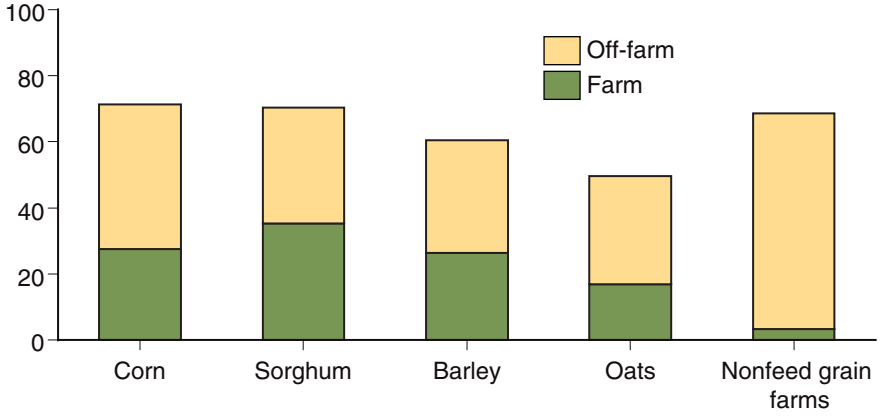
Income for U.S. Feed Grain Farm Households Exceeds U.S. Average

Household income for farm operators consists of the operator's share of the income generated from the farm operation and off-farm income received by the farm family, including such items as wages and salaries from off-farm employment, investment income, pensions, Social Security payments, and gifts. Household income for feed grain operators averaged $69,034 in 2003, nearly $10,000 above the U.S. average household income of $59,067 but nearly equal with average household income ($68,488) for nonfeed grain farm families in 2003 (app. table 1). However, most of the feed grain operators' household income was for off-farm sources, as only 38 percent came from farm income. Household income for corn and sorghum operators averaged about $70,000 in 2003, compared with household incomes of $60,500 for barley producers and $49,600 for oat producers (fig. 17) (app. tables 4-7). Total household income was similar for both specialized and nonspecialized feed grain operators (app. table 3). On average, feed grain farms with annual gross sales of $100,000 or more in 2003 had household incomes above the U.S. average. These farms constituted 44 percent of all feed grain farms.

Figure 17

Household income per farm family, by type of feed grain farm, 2003

Thousand dollars



Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service, 2003 Agricultural Resource Management Survey.

Off-Farm Sources Account for Most of Household Income

As is typical for many farm households, feed grain farms derive the majority of their household income from off-farm income sources. Feed grain farm households, however, received less off-farm income, on average, than nonfeed grain farms. Off-farm income, while supplementing farm income, often reduces the volatility of household income (Mishra and Sandretto).

Feed grain farm families will, on average, have more variability in their household incomes than most farm families because feed grain families derive a higher percentage of their income from farming. In 2003, all feed grain farm households derived 38 percent of their household income from the farm, compared with 5 percent for nonfeed grain farm families. The share of household income generated from farming ranged from 34 percent for oats farms to 50 percent for sorghum farms (app. tables 4-7).

Distribution of Household Income for Feed Grain Farms

The median household income for feed grain producers in 2003 was $49,483, meaning half of the incomes of these households were above this level and half were below. Ten percent of feed grain households had negative household incomes in 2003. The majority of these households did not have sufficient off-farm incomes to offset their negative farm incomes (table 1).[20] When producers were ranked from lowest to highest based on their household income, the average off-farm income exceeded farm income for all producers except those ranked in the top quintile.[21] Income from off-farm jobs or businesses accounted for the bulk of off-farm income.

[20]Off-farm income includes income from off-farm businesses or jobs, Social Security payments, pensions, interest and dividends, gifts, royalties, rental properties, trusts, and other sources.

[21]Farms are ranked from lowest to highest based on household income and then divided into five equal groups. The 20 percent of farm households with the lowest incomes are in the first or bottom quintile, whereas the 20 percent with the highest incomes are in the top or fifth quintile.

Table 1

Household income per farm family for feed grain producers, by quintiles, 2003

Item	Percent				
	1 to 20	21 to 40	41 to 60	61 to 80	81 to 100
	Dollars				
Household income per farm family	-24,765	26,153	48,915	77,462	222,345
Farm income	-40,065	3,329	13,045	27,296	130,730
Off-farm income	15,300	22,824	35,870	50,166	91,614
Earned income from business or job	9,417	14,423	26,456	41,825	70,393
	Percent				
Share of households with off-farm business or job	44	62	74	81	75

Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service, 2003 Agricultural Resource Management Survey.

Government Programs Support the Sector: Ranging From Income Support to Demand Enhancement

Traditionally, safety net programs consisting of income support and crop and revenue insurance provided most of the direct support to the feed grain sector. Other programs, such as incentives for environmental stewardship or demand enhancement, provide a smaller amount of indirect support. However, with the surge in feed grain's use in ethanol production, the relationship between program support and the sector may begin to change. Demand enhancement from renewable energy policies or strong energy prices is expected to strengthen feed grain prices, thereby reducing the level of income support from counter-cyclical payments and marketing loan benefits.

Government programs providing primary income support are nonrecourse marketing assistance loans, direct payments, and counter-cyclical payments as provided by the Farm Security and Rural Investment Act of 2002 (2002 Farm Act).[22, 23] Periodically, separate legislation may provide ad hoc disaster programs. The Agricultural Risk Protection Act of 2000 provides subsidized crop and revenue insurance, thereby reducing the costs of risk protection. Selected provisions of the 2002 Farm Act provide incentives to enhance conservation and environmental stewardship. Demand for feed grains receives minor enhancement through trade promotion programs, food aid, export credit guarantees, and bio-energy programs that ended in 2006.

Marketing Loan Benefits, Direct Payments, and Counter-Cyclical Payments Provide Income Support

As stated above, the government provides income support to the feed grain sector through nonrecourse marketing assistance loans, direct payments, and counter-cyclical payments.[24] Under the 2002 Farm Act, the nonrecourse marketing assistance loan program is continued from the Federal Agricultural Improvement and Reform Act of 1996 (1996 Farm Act). The 2002 Farm Act also provides for direct payments, which replaced production flexibility contract payments, a type of direct payment from the 1996 Farm Act. Counter-cyclical payments were added to stabilize producer income when prices are low. Counter-cyclical payments replace ad hoc market loss assistance payments, provided by Congress on an annual basis from 1998 to 2001. Income support payments in the form of marketing loan benefits, direct payments, and counter-cyclical payments averaged $2.4 billion in 2002/03 and 2003/04, but as prices dropped income support payments rose to an average $9.4 billion in 2004/05 and 2005/06 (fig. 18). Because of strengthening prices in 2006/07, income support payments are expected to be about $2.4 billion, consisting mostly of direct payments.

Marketing assistance loans—The 2002 Farm Act called for a continuation of nonrecourse marketing assistance loan provisions that are implemented in a manner to minimize potential loan forfeitures, to minimize accumulation of stocks, and to allow crops to be marketed freely and competitively worldwide. These commodity-based loans provide short-term financing to eligible

[22]A copy of the 2002 Farm Act can be found at *www.ers.usda.gov/features/farmbill/2002farmact.pdf*. See Young (2002) for a summary of the 2002 Farm Act's provisions.

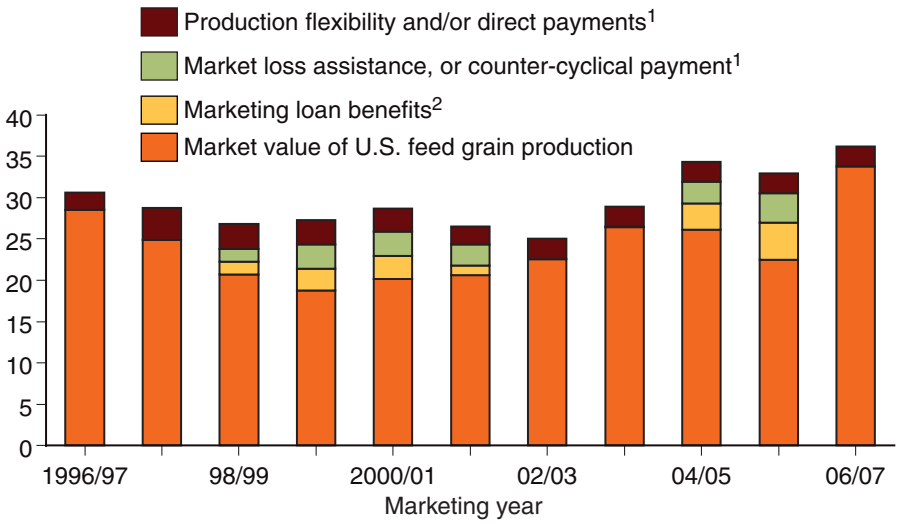
[23]The 2002 Farm Act also retained nearly full planting flexibility. Provisions of the act added soybeans and other oilseeds to the list of crops eligible for direct and counter-cyclical payments. This legislation also allowed producers the option to update their commodity program base acres and payment yields, which are used to calculate program benefits, such as direct or counter-cyclical payments (Young et al., 2005, pp. 22-45).

[24]Marketing loan benefits are paid to producers of feed grains. Direct payments and counter-cyclical payments are not necessarily paid to current feed grain producers but to owners of feed grain base acres.

Figure 18

Role of selected government payments relative to market revenue for U.S. feed grain sector

$ bil.



[1]Payments are made to owners of feed grain production flexibility contract acres or owners of feed grain base acres who may not necessarily be producing feed grains.

[2]Payments are made to feed grain producers.

Sources: Market value of feed grains is available from USDA, National Agricultural Statistics Service, *Crop Values* at *http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1050*. Selected government payments available from USDA, Farm Service Agency, *Feed Grains Fact Sheet: Summary of 2002-2007 Program* at *www.fsa.usda.gov/FSA/newsReleases?area=home&subject=prod&topic=pfs&newstype=prfactsheet&type=detail&item=pf_20030701_insup_en_feedgr03.html*, *Price Support Division Reports* at *www.fsa.usda.gov/FSA/webapp?area=home&subject=prsu&topic=psr* accessed on 11/22/06 and CCC Budget Essentials page *FY 2003 CCC Actuals* and *Commodity Estimates Book for FY 2007 President's Budget* at *www.fsa.usda.gov/FSA/webapp?area=about&subject=landing&topic=bap-bu-cc*.

producers on all reported production. Feed grain national loan rates were raised for the first 2 years of the Act, 2002-03, and reduced slightly for 2004-07, but remain near 2001 levels (table 2).[25] Marketing assistance loan rates are provided to producers at the county level, and these loan rates may differ from the national rate *(www.fsa.usda.gov/FSA/webapp?area=home&subject=prsu&topic=lor)*. After harvesting the commodity, producers may request a marketing assistance loan by pledging the commodity as collateral for the loan. The loan lasts for 9 months from the end of the month that the loan is disbursed. Any time during the loan period, marketing loans may be repaid at the lesser of the principal plus accrued interest and other charges or the alternative loan repayment rate referred to as the posted county price (PCP). At the end of the loan period, the loan must be settled by repaying the loan or forfeiting the pledged collateral to the Commodity Credit Corporation (CCC). Alternatively, loan deficiency payment (LDP) provisions specify that, in lieu of securing a loan, producers may be eligible for a loan deficiency payment.

Marketing loan benefits are tied to current production and price, and, thus, are considered a coupled payment. The per unit benefit equals the amount that the loan rate exceeds the PCP. Marketing loan benefits are realized in the form of marketing loan gains, certificate exchange gains, and loan defi-

[25]See *www.ers.usda.gov/briefing/farmpolicy/historyoffarm.htm*. for references to previous program parameters.

Table 2
Selected grain and oilseed policy parameters: 2002 Farm Act compared with 1996 Farm Act

	Target prices[1]		Direct payment rates: PFC payment rates	Direct payment rates: Direct payment rates	Marketing assistance loan rates		
Commodity	2002-03	2004-07	Avg. 1996-2002	2004-07	2001	2002-03	2004-07
Corn (*$/bu.*)	2.60	2.63	0.330	0.280	1.89	1.98	1.95
Grain sorghum (*$/bu.*)	2.54	2.57	0.400	0.350	1.71	1.98	1.95
Barley (*$/bu.*)	2.21	2.24	0.260	0.240	1.65	1.88	1.85
Oats (*$/bu.*)	1.40	1.44	0.028	0.024	1.21	1.35	1.33
Soybeans (*$/bu.*)	5.80	5.80	n.a.	0.440	5.26	5.00	5.00
Wheat (*$/bu.*)	3.86	3.92	0.620	0.520	2.58	2.80	2.75
Rice (*$/cwt*)	10.50	10.50	2.570	2.350	6.50	6.50	6.50

n.a. = not applicable.
[1]Target price did not exist under the 1996 Farm Act.

Source: Westcott, Young, and Price. *The 2002 Farm Act: Provisions and Implications for Commodity Markets*, pp. 4-6, at www.ers.usda.gov/publications/aib778/aib778.pdf.

ciency payments. Marketing loan gains occur when a producer repays the loan with cash at the alternative loan repayment rate. Certificate exchange gains occur when a producer purchases a commodity certificate and immediately exchanges the certificate for the loan collateral. Loan deficiency payments are paid to producers in lieu of securing a loan.

If a marketing loan gain or certificate exchange gain is earned, all of the interest otherwise owed is forgiven. If the PCP is below the outstanding loan principal plus interest but above the outstanding loan principal, a producer may still benefit by having some of the interest otherwise owed forgiven.

Certificate exchange gains are not applied to payment limitations. These provisions help minimize forfeitures by enabling producers who are facing payment limits an opportunity to repay their loan without forfeiting the loan.

Marketing loan benefits for all feed grains ranged from $22.5 million to $4.5 billion for 2002/03 through 2005/06 (app. table 8) (see fig. 18). Marketing loan benefits were less in 2002/03 because a drought-reduced corn crop led to higher prices. Despite a record corn crop in 2003/04, a brisk demand strengthened corn prices and marketing loan benefits, were also less in 2003/04. However, in 2004/05, a record corn crop with a buildup in stocks led to a significant increase in marketing loan benefits totaling $3.2 billion as the season average corn price declined to $2.06 per bushel. Marketing loan benefits for 2005/06 were estimated at a record high $4.5 billion as of December 20, 2006, as both a large corn crop that caused stocks to rise and storm-related shipping obstructions early in the crop year caused prices to drop, lowering the season average price to $2 per bushel. Because of rising prices in crop year 2006/07, marketing loan benefits are expected to decline significantly to around $3 million.

***Direct payments*—**Direct payments for feed grains are available to eligible owners of feed grain base acres under the 2002 Farm Act. Farmland owners have to sign annual agreements to receive these payments. Direct payment rates for owners of feed grain base acres are set by legislation and remain the same for each year, 2002-07 (see table 2). Producers are not required to produce the specific base-acre commodity to receive direct payments.

Producers have almost total planting flexibility on program acreage except for some limitations on planting wild rice and fruit and vegetables.[26] These payments are considered decoupled because they are not tied to production or price. These payments are going to owners of feed grain base acres who may not necessarily be producing feed grains. A producer's direct payment is equal to the national payment rate times the farm's payment acres times the farm's direct payment yield (see box "Program Parameters Required To Compute Direct and Counter-Cyclical Payments").

Since the payment rate is fixed and aggregate payment acres and aggregate payment yield are nearly constant, direct payments to the owners of feed grain base acres are essentially fixed at about $2.4 billion for crop years 2003/04 through 2006/07 (fig. 18 and app. table 8).

Counter-cyclical payments—These payments are made to owners of a feed grain base when the "effective price" for each feed grain is less than its target price (see table 2). The "effective price" for each feed grain is equal to the sum of the higher of (1) the national average farm price received for the marketing year, or the national loan rate, plus (2) the direct payment rate. The counter-cyclical payment for a producer equals the product of the payment rate, payment acres, and payment yield.[27] Counter-cyclical payments provide a risk-management mechanism for farmers that address some price-related revenue risks.[28] Again, it should be noted that counter-cyclical payments, just like direct payments, go to owners of feed grain base acres, who may not necessarily be producing feed grains.

Counter-cyclical payments for feed grains were not made in 2002/03 and 2003/04 because prices were high enough to keep the effective price equal to or above the target price. However, for 2004/05 corn, sorghum, and barley base acres received a total of about $2.7 billion in counter-cyclical payments (fig. 18 and app. table 8), with payment rates per bushel of $0.29 (corn), $0.27 (sorghum), and $0.15 (barley).[29] Oats base acres did not receive counter-cyclical payments for 2004/05. Counter-cyclical payments for corn, sorghum, and barley base acres in 2005/06 were about $3.6 billion (fig. 18 and app. table 8). Payment rates per bushel for 2005/06 counter-cyclical payments were $0.35 (corn), $0.27 (sorghum), and $0.13 (barley). Oats base acres did not receive counter-cyclical payments in 2005/06. Counter-cyclical payments are not expected to be made for any of the feed grain base acres in 2006/07.

Payment limits—Under the 2002 Farm Act, payment limits per crop year are $75,000 per person for all marketing loan gains and loan deficiency payments, $40,000 per person for direct payments, and $65,000 for counter-cyclical payments. The three-entity rule is retained.[30] Under the three-entity rule, an individual may receive directly a full payment on one entity and up to a half payment for each of two additional entities. Producers having an adjusted gross income over $2.5 million, averaged over 3 years, are not eligible for payments unless more than 75 percent of their adjusted gross income comes from agriculture. Certificate exchange gains are exempt from payment limitations.

[26]Planting for harvest of fruit, vegetables (other than lentils, mung beans, and dry peas), and wild rice (after 2000) was prohibited on PFC acres, except in the following situations: (1) Harvesting double-cropped fruits, vegetables, and wild rice on base acres was permitted, without loss of payments, in any region that has a history of double-cropping covered commodities with the otherwise prohibited crops. An individual farm need not have a double-cropping history, only the region. (2) Harvesting of any fruit, vegetables, or wild rice on PFC acres was permitted, with an acre-for-acre loss of PFC payments for each acre planted to the otherwise prohibited crop, if the Secretary determined that there was a history of planting those crops on the farm. (3) Harvesting a specific fruit, vegetable, or wild rice on PFC acres was permitted, with an acre-for-acre loss of PFC payments for each base acre planted to the specific crop, if the Secretary determined that the producer had an established planting history of the specific crop.

[27]See *www.ers.usda.gov/publications/err12/err12.pdf* for updated base acres, direct payment yields, counter-cyclical payment yields, or more details.

[28]For a further discussion of the payment's effect on production, see Westcott at *www.choicesmagazine.org/2005-3/grabbag/2005-3-05.htm*.

[29]See *www.fsa.usda.gov/FSA/webapp?area=home&subject=ecpa&topic=foa-cc* for more details.

[30]See *www.fsa.usda.gov/FSA/newsReleases?area=home&subject=prod&topic=pfs&newstype=prfactsheet&type=detail&item=pf_20030701_insup_en_payelig03.html* for more information on payment limits.

Program Parameters Required To Compute Direct and Counter-Cyclical Payments

Base acres—Under the 2002 Farm Act, landowners could chose from one of five options to designate their base. Four of the options allowed base acres to be computed by the addition of oilseed acres to the 1996 Farm Act's production flexibility contract acreage. Another option allowed the landowner to designate base acres by selecting the average acreage planted and prevented from planning in 1998-2001. (See Young et al., 2005, pp. 10-12, for more details.)

Payment acres—This designation is equal to 85 percent of the base acres for calculating both direct and counter-cyclical payments. Payment acres for the 1996 Farm Act were 85 percent of the contract acres.

Payment yield—A feed grain's program yield, historically determined, is used to calculate direct and counter-cyclical payments. Payment yields for direct payments could not be updated and so are unchanged from those used in the 1996 Farm Act. Generally, direct program yields are carried forward from program yields established under the 1985 Farm Act (an average of program yields established during the 1981-85 period, 33 percent below current trend yields for corn). However, the feed grain payment yields for counter-cyclical payments could be updated, if base was updated, with one of the following two choices: (1) add to program yields 70 percent of the difference between program yields for the 2002 crop and the farm's average yields for 1998-2001; or (2) use 93.5 percent of the 1998-2001 average yields. If there is a year when the actual yield is less than the county average, the substitute yield was 75 percent of the county average. Nationally, counter-cyclical program payment yields are 25 percent below current trend yields. (See Young et al., 2005, pp. 10-12, for more details.)

Crop Yield and Revenue Insurance Facilitate Risk Protection

U.S. feed grain producers benefit from subsidized crop yield and revenue insurance. They can purchase insurance policies from private insurance companies at subsidized rates under Federal crop insurance programs.[31] These insurance policies make indemnity payments to feed grain producers based on current losses related to either below-average yields (crop yield insurance) or below-average revenue (revenue insurance). From 2001 to 2006, annual net indemnities (indemnities less producer premiums) received by producers of feed grains ranged from $120.9 million to $1,116.5 million (table 3). Net indemnities received by producers of individual feed grains are shown in appendix tables 9-12, with corn accounting for most of the activity.

Since enactment of the Agricultural Risk Protection Act of 2000, which increased insurance subsidies, many feed grain producers have tended to increase their insurance coverage levels and switch to revenue insurance products from the traditional crop yield insurance. For example, in 2000, crop yield insurance was the most frequently used type of insurance for

[31]See *www.ers.usda.gov/briefing/riskmanagement/* for more information on crop insurance.

Table 3
Federal crop insurance for U.S. feed grains

Year	Planted area	Insured area	Participation rate	Total premium	Premium subsidy	Producer premium	Indemnity	Net indemnity
	Million acres		*Percent*	*Million dollars*				
1995	93.8	75.1	80.1	441.6	243.4	198.2	433.6	235.4
1996	104.0	71.8	69.0	627.5	303.7	323.8	348.9	25.1
1997	101.4	61.2	60.4	534.5	243.3	291.2	194.6	-96.6
1998	101.0	62.8	62.2	610.7	270.9	339.8	468.8	129.0
1999	96.4	63.4	65.8	673.0	365.9	307.1	426.7	119.6
2000	99.1	68.1	68.7	812.0	370.1	441.9	519.9	78.0
2001	95.3	67.7	71.0	966.1	552.5	413.6	725.0	311.4
2002	98.5	70.5	71.6	1,024.8	579.4	445.4	1,561.9	1,116.5
2003	97.9	71.4	72.9	1,232.1	701.0	531.1	923.0	391.9
2004	97.0	71.8	74.0	1,539.3	874.0	665.4	953.3	287.9
2005	96.3	71.3	74.0	1,370.9	778.2	592.5	762.7	170.2
2006	92.6	69.7	75.3	1,667.9	933.9	734.0	854.9	120.9

Sources: USDA, Economic Research Service, *Feed Grains Database* at www.ers.usda.gov/data/feedgrains/ and USDA, Risk Management Agency, *Summary of Business* at www.rma.usda.gov/data/sob.html.

producers of corn and sorghum, at the 65-percent coverage level. In 2005, the most often-used product was revenue insurance, at 70-percent coverage (USDA, Risk Management Agency). In contrast, crop yield insurance remained the most frequently purchased insurance product for barley and oat producers, but coverage levels increased for both crop types, rising from 65 to 70 percent for barley and 50 to 65 percent for oats.

Subsidy rates for insurance premiums vary by coverage level and continue to decline for increased coverage levels. For example, the subsidy rate is 100 percent for the minimal CAT coverage and 59 percent for the 70-percent level. In 2006, producer insurance subsidies accounted for about 56 percent of the total feed grain insurance premiums (table 3). Individually, these subsidies ranged from 56 percent for corn to 62 percent for oats (app. tables 9-12). Total premiums are expected to rise in the next several years, as increasing feed grain prices lead to larger liabilities. Consequently, government costs for feed grain crop insurance subsidies are expected to rise along with producer premiums.

One goal of increased insurance subsidies was to encourage producers to rely more on insurance and less on supplemental disaster payments. Generally, the shares of corn and sorghum acres covered by insurance have increased since 2000, but results are mixed for acres of barley and oats. In 2001-06, average participation rates were about 75 percent for corn and sorghum acres, compared with about 69 percent for barley acres and about 21 percent for oats acres. Although many producers have begun to rely more on this risk management tool, many continue to use supplemental disaster payments.

Conservation/Environmental Programs Conserve Land Resources

The 2002 Farm Act continued the conservation compliance provisions for soil erosion and wetlands. Program benefits from marketing assistance

loans, counter-cyclical payments, and direct payments are denied to producers who do not comply with these conservation provisions. The 2002 Farm Act increased conservation funding and made changes in program emphasis. The goals were to expand the amount of U.S. land and the number of farmers covered by conservation programs. The act established a new Conservation Security Program, which pays producers to adopt or maintain practices that address conservation on working lands—lands used for crop production and grazing. Producers were allowed to choose from a wide range of voluntary conservation and environmental programs designed to protect multiple resources.

Land retirement programs—including the Conservation Reserve Program and the Wetlands Reserve Program, remove land from production. Working lands programs, such as the Environmental Quality Incentives Program and the new Conservation Security Program, provide assistance on lands in production.

The conservation and environmental programs contribute to the conservation of land and water resources and wildlife habitats. They provide cost-share, rental, and/or other direct payments to producers for setting land aside into conserving uses or employing farming practices that provide environmental benefits. A summary of the more important programs follows.[32]

Environmental Quality Incentives Program (EQIP)—This program provides technical assistance and incentive payments to assist crop and livestock producers with conservation and environmental improvements on working lands. Cost sharing is offered for a variety of practices, such as nutrient management, livestock waste handling, conservation tillage, terraces, and filter strips. The 2002 Farm Act authorizes this program to receive $5.8 billion from the CCC to cover fiscal 2002-07 and about $11 billion total for 10 years.

Conservation Security Program (CSP)—The Commodity Credit Corporation provides incentive payments to producers to assist in implementing and maintaining various conservation practices on working lands. Producers must submit a plan to USDA identifying resources and land to be conserved that falls into one of three different levels of participation. The higher tiers provide larger payments but require greater conservation measures. The CSP is expected to enhance land productivity. Although CSP was initially approved as an entitlement program with no fixed budget, appropriation legislation for fiscal 2003 limited it to a total of $3.77 billion for 2003-13. This program started in 2004 and expanded in size through 2006.

Conservation Reserve Program (CRP)—Under this voluntary program, owners of farmland offer bids to retire highly erodible and other environmentally sensitive cropland from production for 10-15 years. For accepted bids, producers receive a cost-share payment to establish a permanent cover crop and annual rental payments for retiring land and maintaining specified conservation practices. The CRP is funded through the CCC. The maximum CRP area is set at 39.2 million acres under the 2002 Farm Act, up from 36.4 million acres under the 1996 Farm Act. Currently, 36.1 million acres are enrolled in the CRP. Any expansion of the CRP could reduce the amount of land available for feed grain production. Total net expenditures for the CRP during the past 3 fiscal years, 2003-05, averaged $1.8 billion annually.[33]

[32]See *www.ers.usda.gov/features/farmbill/titles/titleiiconservation.htm* for more information on the 2002 Farm Act regarding these programs and *www.ers.usda.gov/briefing/conservationandenvironment/* for more general information on these programs.

[33]See table 35 at *www.fsa.usda.gov/Internet/FSA_File/07msrweb35.pdf*.

Trade Programs and Energy Legislation Enhance Demand

Other programs support feed grain producers by enhancing the demand for their products. Trade programs have long had a minor effect on the demand for feed grains, while energy legislation and related programs are stimulating an increased use of feed grains (mostly corn) in the production of fuel ethanol.

Trade-related programs—Feed grain producers indirectly benefit from trade-related programs. The 2002 Farm Act reauthorized the following selected trade programs through 2007: export credit guarantees, market development, and P.L. 480 Food Aid.

Export Credit Guarantee programs help finance commercial exports of U.S. agricultural products. The Export Credit Guarantee Program (GSM-102) provides credit terms up to 3 years. These programs provide government guarantees of credit to finance commercial exports of U.S. agricultural products.[34] The Supplier Credit Guarantee Program (SCGP) makes it easier for U.S. exporters to sell agricultural products overseas by extending longer credit terms or increasing the amount of credit available to foreign buyers. The Facility Guarantee Program offers payment guarantees to facilitate the financing of manufactured goods and services exported from the United States to improve or establish agriculture-related facilities in emerging markets. In fiscal 2004, activity in the export credit guarantee program (GSM-102) totaled $279.5 million, or about 4 percent of the total value of fiscal 2004 coarse grain exports. Activity in the SCGP totaled $105.5 million, about 2 percent of total export value for coarse grains in fiscal 2004.[35] Since then the SCGP has become dormant and may not return.

[34]Effective July 1, 2005, the Intermediate Export Credit Guarantee Program (GSM-103), which extended guarantees for 3 to 10 years, was canceled.

[35]See *www.fas.usda.gov/excredits/Monthly/ecg.html* for details.

The Market Access Program (MAP) develops, maintains, and expands markets for agricultural products. It was reauthorized with increased funding to $200 million in fiscal 2006 and 2007. The Foreign Market Development Program helps maintain and develop foreign markets for U.S. agricultural commodities, primarily through trade associations. CCC funds are used to support this program.

Food aid, direct donations, and concessional programs are provided through four program authorities: P.L. 480, also known as Food for Peace; Food for Progress; Section 416(b); and McGovern-Dole International Food for Education and Child Nutrition Program. P.L. 480 has three titles, and each title has a specific objective and provides assistance to countries at a particular level of economic development. Food for Progress is authorized by the Food for Progress Act of 1985 and provides for donations or credit sales of U.S. commodities to developing countries and emerging democracies to support democracy and an expansion of private enterprise. Section 416 (b) is authorized by the Agricultural Act of 1949, as amended. This program provides for overseas donations of surplus commodities acquired by the CCC. The McGovern-Dole International Food for Education and Child Nutrition Program helps support education, child development, and food security for some of the world's poorest children and provides for donations of U.S. agricultural products, as well as financial and technical assistance,

for school feeding and maternal and child nutrition projects in low-income, food-deficit countries that are committed to universal education.

Typically, only a small portion of U.S. feed grain exports are distributed through all these food aid and concessional programs. For example, in fiscal 2004, food aid shipments of feed grains totaled 0.9 million metric tons, or 2 percent of annual coarse grain export volume.[36] The value of these shipments totaled $179.6 million, or 3 percent of total coarse grains exported that year.

Additional program detail and policy can be found at the following links:

- Trade: *www.ers.usda.gov/features/farmbill/titles/titleiiitrade.htm*
- Export programs: *www.fas.usda.gov/exportprograms.asp*
- Food aid: *www.fas.usda.gov/food-aid.asp*

Energy legislation and bioenergy programs—Government incentives provide a stimulus to corn's use for ethanol production, but most of the incentives did not come from farm policies. Selected government programs and policies have served as a catalyst in the development of ethanol, as Federal and State tax incentives made ethanol economically competitive in the fuel marketplace. For example, the Energy Security Act of 1979 created a Federal ethanol tax incentive to reduce dependence on foreign oil.[37] Gasoline marketers (not ethanol producers) were permitted to claim this Federal ethanol tax incentive.

Demand for ethanol received a boost from Congress in 1990 with the passage of the Clean Air Act Amendments (CAAA 90). Congress mandated the use of oxygenated fuels (with a minimum of 2.7 percent oxygen by volume) in specific regions of the United States during the winter months to reduce carbon monoxide. The two most common methods to increase the oxygen content of gasoline were to add MTBE or ethanol.

The American Jobs Creation Act of 2004 maintained the Federal ethanol tax incentive at $0.51 per gallon of ethanol used for fuel but replaced the prior fuel excise tax exemption with an excise tax credit. (Based on ethanol production for 2005 of 4 billion gallons, this equates to a tax credit of about $2 billion.) Also, ethanol producers whose total output does not exceed 30 million gallons of ethanol per year receive a small producer income tax credit of $0.10 per gallon for the first 15 million gallons of production. This credit is capped at $1.5 million per year per producer. The Jump Start Our Business Strength (JOBS) Act passed this incentive along to farmer-owned cooperatives in 2004. Under the Energy Policy Act of 2005, the size limitation on the production capacity for small ethanol producers was increased from 30 million to 60 million gallons, but the income tax credit remains on the first 15 million gallons produced. Indirectly, other Federal programs support ethanol production by requiring Federal agencies to give preference to biobased fuels and by providing incentives for research on renewable fuels.

Cities with the worst smog pollution were required to use reformulated gasoline (RFG), starting in 1995, as provided by the Federal Clean Air Act Amendments of 1990. Congress specified that RFG contain oxygen at 2 percent by weight. Many other cities voluntarily adopted the RFG program.

[36]See *www.fas.USDA.Gov/excredits/FoodAid/reports/fy04tableiv.pdf* for details.

[37]A discussion of additional programs and policies can be found in Schnepf (May 18, 2006).

Bans on MTBE by States caused ethanol to become an oxygenate of choice for the RFG program. For example, in January 2004, MTBE was banned in California and about a year later in New York and Connecticut because it was found to contaminate groundwater drinking supplies.

The Energy Policy Act of 2005, and several of its provisions related to agriculture-based renewable energy production, is one critical factor driving the surge in ethanol supply and demand. The act removed the reformulated oxygenate standard 270 days after enactment, May 2006 (Eidman, p. 6). Oil refiners long maintained that they could produce gasoline that meets clean air standards without MTBE or oxygenates. However, this act maintained RFG air quality standards to protect gains made in air quality, thereby continuing the need for reformulated gasoline. Furthermore, the act held oil companies liable for MTBE spills, thus reducing use of MTBE and stimulating ethanol demand. Lastly, the act requires a renewable fuels standard mandating a minimum amount of renewable fuels per year, 4.0 billion gallons for 2006, and moving up to 7.5 billion gallons in 2012.

Under the Bioenergy Program created in fiscal 2001, the CCC made payments to eligible bioenergy producers to encourage increased purchases of agricultural commodities to expand bioenergy production of ethanol and biodiesel and to encourage the construction of new production capacity.[38] The 2002 Farm Act continued the program through fiscal 2006. Title IX of the 2002 Farm Act (Energy Title) reauthorized and broadened the bioenergy program.[39] Furthermore, this title established new programs and grants for procurement of biobased products to support development of biorefineries; provided for education of the public about benefits of biodiesel fuel use; and assisted eligible farmers, ranchers, and rural small businesses in purchasing renewable energy systems. The bioenergy program was funded at up to $150 million per fiscal year for 2003 and 2004, $100 million for fiscal 2005, and $60 million for fiscal 2006. Most of this funding went to ethanol producers. For example, in fiscal 2004, 86 percent of the $149.4 million went to ethanol producers.[40] Producers using corn as a feedstock accounted for 96 percent of the ethanol program payments, with minor amounts claimed by producers of sorghum and wheat. Average annual payments to ethanol producers ranged from $0.12 to $0.30 per gallon during fiscal 2001 through fiscal 2005.

The United States also imposes an import tariff on ethanol imports, which limits the importation of cheaper foreign ethanol. A normal trade relations duty on imported ethanol has two components: a regular duty of 2.5 percent ad valorem and a secondary duty of $0.54 per gallon.[41]

This import tariff in many cases negates lower production costs in other countries. Limited duty-free imports, up to 7 percent of consumption is authorized, do occur under the Caribbean Basin Initiative (CBI). Investments under way are expected to increase actual CBI imports, mainly Brazilian ethanol processed in the CBI region.

Several States have their own incentives, regulations, and programs in support of renewable fuel research, production, and consumption that supplement or exceed Federal incentives.[42] Also, demand for renewable energy from agriculture is being driven partly by State Renewable Portfolio

[38]See *www.fsa.usda.gov/FSA/newsReleases?area=home&subject=prod&topic=pfs&newstype=prfactsheet&type=detail&item=pf_20040801_comop_en_biopr04.html* for program details.

[39]See *www.ers.usda.gov/Features/Farmbill/titles/titleIXenergy.htm* for details.

[40]See *www.fsa.usda.gov/Internet/FSA_File/bioenergy.pdf* for details.

[41]Recently, the tariff was extended for 2 years until January 2009. It was set to expire in October 2007.

[42]For more information on State and Federal programs, see *State and Federal Incentives and Laws*, at DOE's Alternative Fuels Data Center, *www.eere.energy.gov/afdc/laws/incen_laws.html*.

Standards (RPS). As of January 2006, 34 States had laws where their RPSs required that State vehicle fleets procure certain volumes of renewable fuels.

The combination of the Energy Policy Act of 2005, encouraging further expansion of ethanol production by mandating the use of 7.5 billion gallons of renewable fuels by 2012, and current oil prices have stimulated corn's use in ethanol production. Assuming ethanol prices remain at or above current levels of around $2 per gallon, government payments from marketing loan benefits and counter-cyclical payments will likely be very small or nonexistent because corn prices will be supported above levels triggering these program benefits. Renewable energy policy will support the sector through demand enhancement, in part, from Federal tax credits. For example, a 7.5-billion to 14-billion gallon ethanol supply would provide a Federal tax credit that ranges from $3.8 billion to $7.1 billion. These tax credits that go to gasoline marketers tend to increase demand for corn and contribute to higher corn prices.

Issues for Upcoming Farm Legislation

Potential changes to feed grain programs will likely be discussed in the upcoming farm legislation debate, with a consideration for domestic budget priorities, domestic policy issues, such as renewable fuel policies and use of feed grains for ethanol or increased conservation concerns, and international obligations.[43] Stakeholders in the feed grain sector (producers and owners of base acres) are concerned about future agricultural policy and resulting government payments that are likely to evolve from the ongoing deliberations regarding these issues. Most likely, future feed grain policy will largely be determined by the direction of overall farm policy, particularly programs affecting direct commodity payments to producers of major field crops. Domestic market conditions and Federal budget concerns are important factors in this policy debate. In addition, trade policy (WTO negotiations and regional trade agreements), with its market access and domestic support issues, and renewable energy policy will also likely enter into the discussions.[44]

[43]See *www.usda.gov/wps/portal/!ut/p/_s.7_0_A/7_0_1OB?navid=FARM_BILL_FORUMS* for USDA's 2007 farm bill proposals.

[44]For a discussion of farm bill issues discussed at USDA's Farm Forums, see *www.usda.gov/wps/portal/!ut/p/_s.7_0_A/7_0_1UH?contentidonly=true&contentid=2006/03/0106.xml*.

Federal Budget Deficit

The Federal budget deficit, in particular, will likely play a significant role in the farm bill debate. The 2002 Farm Act was considered at a time when projected budget surpluses allowed for increased spending on farm programs. However, current policy deliberations are occurring at a time of concern over current and future Federal budget deficits, which may impact funding for domestic farm programs. Thus, budget concerns and other policy issues could result in potential changes to the overall level of spending and basic structure of commodity programs, or in modifications to the parameters of existing programs and international obligations.

Domestic Policy Issues

Funding levels for currently supported crops could change due to international obligations or because of budget reasons. Current policy parameters, such as loan rates, direct and counter-cyclical payment rates, commodity certificates, payment limitations, and crop insurance provisions, could be reconsidered. For any given level of support, there will be less to distribute to existing program crops if other commodities seek support or if there is expanded support for conservation or other programs.[45]

Planting flexibility exclusion of fruits and vegetables—The 2002 Farm Act continued planting flexibility with the exclusion of planting fruit and vegetables on base acres.[46] During the U.S. WTO cotton case, the WTO panel ruled that U.S. direct payments for cotton did not meet the definition of decoupled payments as specified by the Uruguay Round Agreement on Agriculture (URAA) (Schnepf, 2004). The criteria require that there be no restrictions on the choice of crops grown by the payment-receiving producer. If producers of program commodities could plant set-aside land with fruit and vegetables, the producers of fruit and vegetables feared it would depress prices and hurt primary growers of those commodities, who received no government support. When direct payments were created, this

[45]For more information on risk management, see USDA's 2007 farm bill theme paper, "Risk Management," at *www.usda.gov/documents/Farmbill07riskmgmtrev.pdf*.

[46]Restricted crops include: wild rice, fruit (including nuts), vegetables, other than lentils, mung beans, and dry peas. Dry peas include Austrian, wrinkled seed, green, yellow, and umatilla. Peas grown for the fresh, canning, or frozen market are not dry peas. See USDA, CCC (2002), p. 64759, for a complete list of prohibited crops.

fruit and vegetable exclusion rolled forward into the direct payment rules. If the U.S. removes this exclusion, it is conceivable that the fruit and vegetable industry will seek some level of support.

Revenue assurance program potential—Revenue insurance was relatively new when the 2002 farm bill was passed, and most farmers were purchasing yield insurance at that time. The 2002 farm bill income support programs were still thought of as critical to support revenue. But with most farmers now insuring revenue directly, the time to rethink approaches to supporting sector revenue may have arrived. Targeting revenue explicitly could be much more cost-effective (Babcock). Some farm organizations are studying alternative gross revenue assurance programs that could be used to replace disaster payments, crop insurance, marketing loans, loan deficiency payments, and counter-cyclical payments. Proponents argue that such an approach could provide positive benefits regarding international obligations and could reduce the level of "amber box" expenditures.[47]

Renewable fuels program—Interest in renewable energy along with rising energy prices led to recent legislation, the Renewable Fuel Program of the Energy Policy Act of 2005. The renewable fuels program has interest from many farm organizations, and they are likely to advocate a larger role for agriculture in renewable fuels during the ongoing policy discussions. Broader issues that most likely will enter the renewable fuel debate are the economics of ethanol production, policies and subsidies to support ethanol production, mandated minimum use for gasoline/diesel blends, protection against low-cost imports, such as ethanol from sugar cane or biodiesel from palm oil, and concerns about ethanol's impact on the U.S. livestock industry. How will energy policies interact with existing farm and nutrition safety net policies? Does the United States need a feed grain reserve to provide an adequate supply of ethanol and feed in times of drought?[48]

Should policies be enacted to offset a potential decline in crude oil prices and, therefore, a drop in ethanol demand, thereby offsetting a boom and bust cycle in agriculture? For example, a decline in crude oil prices could be offset by government policy mandating ethanol production above market equilibrium levels. Such policies already exist through the $0.51 per gallon blender credit, the import tariff, and the mandated minimum production level of 7.5 billion gallons by 2012. Raising the mandated level of production or increasing the blending credit could offset lower crude oil prices.

Increased emphasis on conservation and environmental programs—Conservation and environmental programs may provide a mechanism for making direct payments that are less trade distorting and potentially considered "green box" by the WTO.[49] Environmental groups and farm organizations cooperated and were instrumental in passing the Food Security Act of 1985 (1985 Farm Act), which introduced the Conservation Reserve Program. The 2002 Farm Act created a new conservation program, the Conservation Security Program. Consequently, there could be renewed interest in funding this and other environmental programs.[50] The need for a conservation program should be especially heightened due to all the additional corn acreage that will most likely be planted to meet increasing demands from ethanol.

[47]See *www.ers.usda.gov/briefing/wto/glossaries.htm* for a definition of "amber box."

[48]For more information on energy and agriculture policy issues, see USDA's 2007 farm bill theme paper, "Energy and Agriculture," at *www.usda.gov/documents/Farmbill07energy.pdf*.

[49]See *www.ers.usda.gov/briefing/wto/glossaries.htm* for a definition of "green box."

[50]For more information on conservation and environmental policy issues, see USDA's 2007 farm bill theme paper, "Conservation and Environment," at *www.usda.gov/documents/FarmBill07consenv.pdf*.

Government payments support land values—Future changes to government programs and their payments may affect land values and rental rates, which could impact future income statements and/or balance sheets of the farm sector. Research results report that government program payments, such as marketing loan benefits and direct and counter-cyclical payments, are partially capitalized into land values and rental rates (Barnard et al., Burfisher et al., and Roberts et al.) Such effects impact the wealth of farmland owners (increased land values), rental income of farmland owners (increased rental income) and producer's production costs (increased rental payments or land purchase costs). Nearly two-thirds of the program acreage is leased. Even though the operator receives the payment, government payments tend to be a passed through to the landlord in the form of higher rents.

Higher prices due to government incentives to convert corn to ethanol are rapidly being capitalized into land values. Current market conditions, corn futures prices to the 2009/10 marketing year, planned ethanol plants, and those currently under construction point to higher corn prices that will cause land prices to rise.

Trade Policy

Trade policy concerns associated with multilateral (WTO) and regional trade agreements, such as NAFTA, have increasingly become a part of the U.S. farm bill debate.[51] As a member of the WTO, for example, the United States agreed to limit the amount of trade-distorting domestic support provided to the agricultural sector, reduce export subsidies, and lower import tariffs and other trade restrictions. Currently, feed grain producers benefit from marketing loan benefits and crop insurance subsidies that are subject to aggregate spending limits under the existing WTO agreement. These spending limits could be further reduced and/or modified if an agreement is reached under the Doha Round.[52] In addition, the feed grain sector receives direct payments and benefits from environmental programs that have been reported to the WTO as green box expenditures, not subject to any spending limits.[53] For feed grains, the United States would like to see more equitable treatment in the areas of market access, domestic support, export subsidies, and technical barriers to trade.

Implications of WTO negotiations and future agricultural programs—WTO negotiations were suspended on July 24, 2006. Consequently, uncertainty looms over the future of these negotiations and their implications for U.S. domestic agriculture programs.

The Hong Kong Ministerial Agreement, December 13-18, 2005, was a general statement aimed at moving discussions forward on an overall Doha Round Agreement on agriculture. This agreement built upon the Doha Ministerial and the August 2004 "Framework Agreement" and input received from member countries. The Hong Kong Ministerial Agreement called for, in part, reductions in trade-distorting domestic support and elimination of export subsidies, and increased market access.[54]

Reductions in global trade distortions would benefit the U.S. feed grain market (Hoffman and Dohlman). Currently, the average allowed WTO tariff

[51]For more information about trade issues and policies, see *www.fas.usda.gov/ustrade.asp*.

[52]See *www.ustr.gov* with the Office of the U.S. Representative for the latest U.S. reform proposal for the Doha Round of WTO negotiations.

[53]Direct payments are made to owners of feed grain base and do not necessarily go to current feed grain producers.

[54]For more information, see *www.fas.usda.gov/itp/wto/hongkong/hkdec1205.pdf*.

for corn is 67 percent, compared with the U.S. tariff of less than 1 percent.[55] The average allowed WTO tariff for barley is 78 percent compared with the U.S. tariff of less than 1 percent.[56]

Furthermore, Brazil's challenge to U.S. cotton programs, although not directly related to feed grains, may have general ramifications for U.S. commodity programs, including the marketing loan and counter-cyclical payments programs that were implicated in the ruling (Schnepf, 2004, and Schnepf and Womach). For example, Canada has launched a challenge at the WTO against what it sees as the trade-distorting subsidies the U.S. gives to its corn farmers (Callan). This action comes after Canada's own International Trade Tribunal ruled in May 2006 that U.S. corn imports did not hurt the domestic Canadian industry, following an investigation into a 2005 complaint by Canadian Corn Producers (Schnepf, April 2006). The United States has already made some adjustments to its export credit guarantee programs to come into compliance with one aspect of the WTO ruling on export subsidies.[57] In addition, future trade agreements may place limits on food assistance programs in which commodities are donated directly to needy countries, although this would likely have little effect on feed grains.

Regional trade agreements—NAFTA has led to greater integration in the North American feed grain markets. Due to special concerns of Mexican negotiators, longer implementation periods were negotiated for tariff liberalization of some feed grains. For example, the opening of the Mexican market occurred instantly for sorghum, required 9 years for rice, soybeans, and wheat, but will take 14 years for corn. Under NAFTA, Mexican corn tariffs are scheduled to be phased down and disappear by 2008. As corn tariffs are reduced and then eliminated, Mexican feed compounders are expected to shift to imported U.S. corn, away from U.S. sorghum imports. Starting in 2008, Mexico's imports of U.S. kibbled or cracked corn (processed corn that was tariff free) are expected to be replaced entirely by imports of whole-grain corn.

Mexico's current system of variable rate quotas for corn with over-quota imports tends to discourage corn imports and boost sorghum imports that do not have quotas. Broader access to U.S. feed corn (yellow), which is deficit in Mexico, is leading to the development and growth of Mexico's hog and poultry sectors (Zahniser). However, U.S. white corn exports to Mexico have declined since 2000. Mexico continues to maintain a tariff to support its domestic producers of white corn, but U.S. exports of white corn may again flow more freely with the tariff elimination in 2008.

On July 27, 2006, the United States and Mexico announced an agreement on market access for sweeteners. Effective January 1, 2008, there will be no duties or quantitative restraints on sugar or high fructose corn syrup trade between the two countries.

[55]See *www.fas.usda.gov/info/factsheets/WTO/commodities2002/Corn2.pdf* for more information.

[56]See *www.fas.usda.gov/info/factsheets/WTO/commodities2002/Barley2.pdf* for more information.

[57]Effective July 1, 2005, the Intermediate Export Credit Guarantee Program (GSM-103), which extended guarantees for 3 to 10 years, has been canceled.

Conclusion

The U.S. feed grain sector faces unprecedented demand conditions as increased demand from nonagricultural (ethanol) sources has the potential to raise feed grain prices above support levels. The accelerating use of corn for ethanol production has the potential to change the traditional crop mix, as more corn will be needed for ethanol uses. Thus, levels of government income support to the feed grain sector may become smaller than in the past 2 crop years when corn set record production levels and prices declined. With growing reliance on market returns, the U.S. feed grain sector continues to need flexible, low-cost transportation and an ability to identify value-enhanced attributes of grain.

Future agricultural policies will consider domestic market conditions, Federal budget concerns, trade policy, and renewable energy policy. Funding levels for currently supported crops could change due to changes related to international obligations or because of budget reasons. Current policy parameters, such as loan rates, direct and counter-cyclical payment rates, commodity certificates, and payment limitations, could be reconsidered. For any given level of support, there will be less to distribute to existing program crops if other commodities seek support or if support expands for conservation programs. Requirements for increased program efficiency may necessitate the need to redirect marketing loan benefits and counter-cyclical payments into other programs, such as crop revenue insurance products or environmental programs.

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Useful Links

Feed Outlook
(*http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1273*) provides a monthly update (except April) of current market developments influencing the corn industry.

Feed Yearbook
(*http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do;jsessionid=0E11CCF164609A336DE466D9074EE0B9?documentID=1274*) provides an annual summary of the previous market year and outlook for the current market year.

Feed Grains Database
(*www.ers.usda.gov/data/feedgrains/*) is a queriable database that contains monthly, quarterly, and annual data on prices, supply, and use of corn and other feed grains. This includes data published in the monthly *Feed Outlook* and the annual *Feed Yearbook* reports.

Season-Average Price Forecasts
(*www.ers.usda.gov/data/priceforecast/*) provides three Excel spreadsheet models that use futures prices to forecast the U.S. season-average price and counter-cyclical payment rate for corn, soybeans, and wheat. Users can view the model forecasts or create their own forecast by inserting different values for futures prices, basis values, or marketing weights.

Agricultural Baseline Projections
(*www.ers.usda.gov/briefing/baseline/*) contains longrun projections covering supply, demand, prices, and other economic variables for major U.S. crop and livestock sectors.

Foreign Agricultural Trade of the United States (FATUS)
(*www.ers.usda.gov/data/fatus/*) provides U.S. agricultural exports and imports, volume and value, by country, by commodity, and by calendar year, fiscal year, and month, for varying periods, such as 1935 to the present or 1989 to the present. Updated monthly or annually.

Production, Supply and Distribution (PSD) Database
(*www.fas.usda.gov/psd/*) contains official USDA data on production, supply, and distribution of agricultural commodities for the United States and major importing and exporting countries. The database provides projections for the coming year and historical data for more than 200 countries and major crop, livestock, fishery, and forest products.

Quick Stats: Agricultural Statistics Database
(*www.nass.usda.gov/QuickStats/*) offers U.S., State, and county-level agricultural statistics for many commodities and data series. Quick Stats offers the ability to query by commodity, State, and year. The dataset can be downloaded for easy use in a database or spreadsheet.

Agricultural Atlas of the United States
(*www.nass.usda.gov/research/atlas02/*) provides maps showing county-level data from the 2002 Census and some maps showing increases and decreases from 1997 census data.

Farm Policy Background, Program Provisions, and History
(*http://www.ers.usda.gov/Briefing/FarmPolicy/historyOfFarm.htm*) provides access to previous farm bills and policy backgrounders prepared by ERS for those bills.

Farm Programs, Price Supports, Participation, and Payment Rates
(*http://www.ers.usda.gov/Briefing/FarmPolicy/Data/Provisions.xls*) contains program parameters for individual commodities.

CCC Net Outlays by Commodity and Function
(*www.fsa.usda.gov/Internet/FSA_File/07msrweb35.pdf*) provides total Commodity Credit Corporation expenditures by commodity.

U.S. and State Farm Income Data Includes Calendar Year Data on Direct Government Payments

Direct government payments, history
(*www.ers.usda.gov/data/farmincome/finfidmu.htm#payments*)

Latest forecast
(*www.ers.usda.gov/briefing/farmincome/data/gp_t7.htm*)

Price Support Loan and LDP Activity Report
(*www.fsa.usda.gov/FSA/webapp?area=home&subject=prsu&topic=psr*) includes data on year-to-date and the previous 4 years of marketing loan and loan deficiency payment expenditures.

National and County Commodity Loan Rates
(*www.fsa.usda.gov/FSA/webapp?area=home&subject=prsu&topic=lor*) provides county and national marketing loan rates.

Farm Program Acres
(*www.ers.usda.gov/data/baseacres/*) allows downloading and mapping of county-level farm program and planted acreage data for nine major program crops (corn, grain sorghum, barley, oats, wheat, rice, cotton, peanuts, and oilseeds).

WTO Agricultural Trade Policy Commitments Database
(*www.ers.usda.gov/db/wto/*) contains data on implementation of trade policy commitments by WTO member countries. Data on domestic support, export subsidies, and tariffs are organized for comparison across countries. This database provides the user various options for viewing and downloading data.

U.S. WTO Domestic Support and Support Reduction Commitments
(*www.ers.usda.gov/briefing/farmpolicy/usnotify.htm*) summarizes the U.S. domestic support notifications to the WTO.

Grain Standards and Quality
(*www.gipsa.usda.gov/GIPSA/webapp?area=home&subject=grpi&topic=sq*) provides details on how official inspections are conducted for grains,

oilseeds, and other agricultural and processed commodities based on established official U.S. standards, and on sound, proven, and standardized procedures, techniques, and equipment.

Grain and Feed Weekly Summary Statistics
(*http://marketnews.usda.gov/LSMNPubs/PDF_WEEKLY/DC_GRAIN.PDF*) provides weekly market news, futures settlement and close, grain and soybean cash bids, grain and soybean export inspections, grain and soybean barge movements, and wholesale feedstuff prices.

Grain Transportation Report
(*www.ams.usda.gov/tmdtsb/grain/*) provides weekly developments affecting the transport of grain, both in the domestic and international marketplace. The report provides statistical information on rail, barge, and vessel loadings and deliveries, along with other information on issues affecting the movement of grain from the farm to the domestic and international marketplace.

Trade Issues and Policies
(*www.fas.usda.gov/issues_policies.asp*) provides information on current trade policies and issues.

Appendix table 1

Characteristics of U.S. farms, by feed and nonfeed grain farms, 2003

Item	Feed grains (A)	Nonfeed grain farms (B)	All
Number of farms	422,936 B	1,697,883 A	2,120,819
Percent of farms	20	80	100
Feed grains as percent of value of production	28 B	0 A	11
Corn as percent of value of production	26 B	0 A	10
Total operated acres per farm	784 B	342 A	430
Owned and operated	343 B	219 A	244
Cropland acres	550 B	86 A	179
Percent of farms producing:			
Corn	84 B	0 A	17
Oats	17 B	0 A	3
Barley	7 B	0 A	1
Sorghum	9 B	0 A	2
Soybeans	59 B	3 A	14
Cattle	49 B	46 A	46
Dairy	13 B	2 A	4
Wheat	28 B	3 A	8
Hay	19 B	16 A	17
Operator occupation (*percent*):			
Farming	66 B	28 A	36
Nonfarm	24 B	50 A	45
Retired	10 B	21 A	19
Operator age (*mean*)	54 B	56 A	56
Less than 50 years (*percent*)	40 B	31 A	33
65 or more (*percent*)	22 B	28 A	26
Operator education (*percent*):			
High school	86 B	89 A	89
Completed college	17 B	21 A	20
Farm organization (*percent*):			
Sole or family proprietor	87 B	92 A	91
Partnership	7 B	4 A	5
Family corporation	5 B	3 A	3
Gross cash income per farm (*dollars*)	186,579 B	58,740 A	84,234
Crop cash receipts	91,491 B	23,444 A	37,014
Livestock cash receipts	53,729 B	22,204 A	28,491
Government payments	15,838 B	2,780 A	5,384
Direct	8,837 B	746 A	2,360
CCP and LDP	2,639 B	520 A	942
CRP, WRP, and EQIP	846 B	737 A	758
Other	3,516 B	173 A	202
Federal crop insurance indemnities	3,690 B	778 A	1,324
Cash production expenses	140,662 B	49,865 A	67,972
Net cash income	45,916 B	8,875 A	16,262
Net farm income	41,823 B	12,515 A	18,360
Farms with government payments (*percent*)	81 B	29 A	39
Farms with Federal crop insurance (*percent*)	25 B	2 A	7
Household income per farm family (*dollars*)	69,034	68,488	68,597
Farm income	26,220 B	3,297 A	7,884
Off-farm income	42,814 B	65,191 A	60,713
Earned income from business or job	32,227 B	49,249 A	45,843
Percent with off-farm business or job	68 B	73 A	72

Coefficient of Variation = (Standard Error/Estimate) x 100. * indicates that CV is greater than 25 and less than or equal to 50. A and B indicate significant column differences based on *t*-statistics at a 90-percent confidence level or higher.

Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service, 2003 Agricultural Resource Management Survey.

Appendix table 2

Operating characteristics of U.S. feed grain farms, 2003

Item	Specialized (A)	Nonspecialized (B)	Farm-use-only (C)	All
Number of farms	124,273 B	189,195 AC	109,468 B	422,936
Percent of farms	29	45	26	100
Percent of all feed grain production	51	43	6	100
Percent of value of production				
Feed grains	63.8 BC	20.4 AC	0.0 AB	28.2
Corn	61.7 BC	17.6 AC	0.0 AB	26.1
Barley	0.8 BC	1.1 AC	0.0 AB	0.8
Oats	0.1 BC	0.2 AC	0.0 AB	0.1
Sorghum	*1.3 C	1.5 C	0.0 AB	1.2
Total operated acres per farm	661 B	964 AC	611 B	784
Owned and operated	236 BC	389 A	384 A	343
Rented	424 BC	568 AC	210 AB	433
Cropland acres	573 BC	710 AC	249 AB	550
Harvested feed grain acres	306 BC	215 AC	56 AB	201
Number of commodities per farm	2.6 BC	4.3 A	4.2 A	3.8
Percent of farms producing:				
Corn	96 BC	81 A	77 A	84
Oats	5 BC	15 AC	32 AB	17
Barley	2 BC	9 A	9 A	7
Sorghum	5 BC	16 AC	*3 AB	9
Soybeans	74 C	70 C	24 AB	59
Cattle	15 BC	58 AC	72 AB	49
Dairy	[a]0 BC	10 AC	31 AB	13
Wheat	14 B	45 AC	15 B	28
Hay	15 B	23 A	17	19
Operator occupation (*percent*):				
Farming	63 B	74 AC	56 B	66
Nonfarm	28 B	18 AC	29 B	24
Retired	8	8	*15	10
Operator age (*mean*)	53	54	53	54
Less than 50 (*percent*)	40	41	36	40
65 or more (percent)	22	23	20	22
Operator education (*percent*):				
High school	94 BC	90 AC	71 AB	86
Completed college	19 C	17	14 A	17
Farm organization (*percent*):				
Sole or family proprietor	86 C	84 C	93 AB	87
Partnership	6	8 C	5 B	7
Family corporation	7 C	6 C	3 AB	5
Farm typology	100	100	100	100
Rural residence	35	24	43	32
Intermediate	44	49	46	47
Commercial	19	25	11	20
ERS regions	100	100	100	100
Heartland	70	44	24	47
Northern Crescent	13	18	41	22
Prairie Gateway	10	21	*6	14
Other	8	17	30	18

Coefficient of Variation = (Standard Error/Estimate) x 100. * indicates that CV is greater than 25 and less than or equal to 50.

[a] indicates that CV is above 50. A, B, and C indicate significant differences in column figures based on *t*-statistics at a 90-percent confidence level or higher.

Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service, 2003 Agricultural Resource Management Survey.

Appendix table 3

Financial characteristics of U.S. feed grain farms, 2003

Item	Specialized (A)	Nonspecialized (B)	Farm-use-only (C)	All
Gross cash income per farm (*dollars*)	170,456 BC	230,089 AC	129,682 AB	186,579
Crop cash receipts	121,518 C	116,265 C	14,585 AB	91,491
Livestock cash income	4,262 BC	61,475 AC	96,499 AB	53,729
Government payments	15,113 BC	20,707 AC	8,244 AB	15,838
Direct	10,304 C	11,377 C	2,783 AB	8,837
CCP and LDP	2,614 BC	3,682 AC	864 AB	2,639
CRP, WRP, and EQIP	917 C	1,004 C	492 AB	846
Other	1,278 BC	4,644 A	4,105 A	3,516
Federal crop insurance indemnities	3,895 BC	4,997 AC	*1,200 AB	3,690
Cash production expenses	131,607 BC	168,302 AC	103,171 AB	140,662
Net cash income	38,848 BC	61,787 AC	26,511 AB	45,916
Net farm income	35,167 BC	57,069 AC	23,027 AB	41,823
Percent of farms with:				
Negative net cash income	32 BC	23 AC	42 AB	30
Negative net farm income	26	24	25	25
Farms with government payments (*percent*)	87 C	90 C	57 AB	81
Direct	79 C	80 C	42 AB	70
CCP and LDP	45 C	42 C	20 AB	38
CRP, WRP, and EQIP	23 C	19 C	10 AB	18
Other	16 BC	36 A	35 A	30
Farms with Federal crop insurance (*percent*)	25 BC	32 AC	12 AB	25
Household income per farm family (*dollars*)	76,007 C	75,704 C	49,886 AB	69,034
Farm income	22,635 BC	36,689 AC	12,440 AB	26,220
Off-farm income	53,373 BC	39,016 A	37,446 A	42,814
Earned income from business or job	42,232 BC	28,733 A	26,963 A	32,227
Percent with off farm business or job	73 B	64 A	68	68
Average value (*dollars per farm*):				
Farm assets	903,211 B	1,045,237 AC	796,049 B	939,008
Farm debt	115,915 C	134,546 C	93,244 AB	118,382
Farm equity	787,296 B	910,691 AC	702,805 B	820,626
Debt/asset ratio	13	13	12	13

Coefficient of Variation = (Standard Error/Estimate) x 100. * indicates that CV is greater than 25 and less than or equal to 50.
A, B, and C indicate significant differences in column figures based on *t*-statistics at a 90-percent confidence level or higher.
Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service,
2003 Agricultural Resource Management Survey.

Appendix table 4

Characteristics of U.S. corn farms and their operators, by specialization in corn, 2003

Item	Specialized (A)	Nonspecialized (B)	Farm-use-only (C)	All
Number of farms	115,724 BC	151,756 AC	89,886 AB	357,366
Percent of farms	32	42	25	100
Percent of total corn value	53	41	6	100
Feed grains as percent of value of production	64 BC	22 AC	0 AB	30
Corn as percent of value of production	63 BC	21 AC	0 AB	29
Total operated acres per farm	640 BC	827 AC	488 AB	681
Owned and operated acres	230 B	313 A	262	274
Harvested corn acres	298 BC	204 AC	59 AB	198
Percent of farms producing:				
Soybeans	77 BC	82 AC	30 AB	67
Cattle	15 BC	59 AC	76 AB	49
Dairy	0 BC	11 AC	37 AB	14
Wheat	13 B	40 AC	15 B	25
Hay	13 BC	21 A	19 A	18
Operator occupation (percent):				
Farming	63 B	74 AC	61 B	67
Nonfarm	29 B	17 AC	23 B	22
Retired	9	9	16	10
Operator age (*mean*)	53	53	53	53
Less than 50 (*percent*)	40	44	38	41
65 or more (*percent*)	21	22	22	22
Operator education (*percent*):				
Completed high school	94 C	91 C	66 AB	86
Completed college	20 BC	14 A	14 A	16
Farm organization (*percent*):				
Sole or family proprietor	86 C	85 C	92 AB	87
Partnership	6	8 C	5 B	7
Gross cash income per farm (*dollars*)	174,575 B	242,527 AC	143,688 A	195,662
Crop cash receipts	125,220 C	123,702 C	15,839 AB	97,063
Livestock cash receipts	4,358 BC	66,479 AC	107,946 AB	56,792
Government payments	15,153 BC	20,440 AC	8,631 AB	15,758
Direct	10,462 C	11,303 C	2,805 AB	8,893
CCP and LDP	2,630 BC	3,734 AC	916 AB	2,668
CRP, WRP, and EQIP	878	961 C	*551 B	831
Other	1,183 BC	4,442 A	4,359 A	3,366
Federal crop insurance indemnities	3,496 BC	4,768 AC	1,569 AB	3,552
Cash production expenses	134,968 C	176,486 AC	114,759 B	147,516
Net cash income	39,607 BC	66,042 AC	28,929 AB	48,147
Net farm income	35,998 BC	60,795 AC	24,312 AB	43,589
Farms with government payments (*percent*)	88 C	91 C	62 AB	83
Farms with Federal crop insurance (*percent*)	24 BC	29 AC	14 AB	24
Household income per farm family (*dollars*)	77,059 C	78,719 C	51,280 AB	71,202
Farm income	23,172 B	38,884 AC	14,579 B	27,624
Off-farm income	53,887 BC	39,835 A	36,701 A	43,578
Earned income from business or job	42,721 BC	29,554 A	26,312 A	32,984
Percent with off-farm business or job	73 C	65	65 A	67

Coefficient of Variation = (Standard Error/Estimate) x 100. * indicates that CV is greater than 25 and less than or equal to 50. [a] indicates that CV is above 50. A, B, and C indicate significant column differences based on *t*-statistics at a 90-percent confidence level or higher.
Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service,
2003 Agricultural Resource Management Survey.

Appendix table 5

Characteristics of U.S. sorghum farms and their operators, by specialization in sorghum, 2003

Item	Specialized (A)	Nonspecialized (B)	Farm-use-only (C)	All
Number of farms	*3,091 B	33,105 AC	3,140 B	39,336
Percent of farms	8	84	8	100
Percent of total sorghum value	8	89	3	100
Feed grains as percent of value of production	73 BC	33 AC	*1 AB	31
Corn	a4 B	20 AC	*1 B	19
Sorghum	68 BC	12 AC	0 AB	12
Total operated acres per farm	*979	1,520	*2,375	1,546
Owned and operated acres	*106 BC	472 A	*1,779 A	548
Harvested sorghum acres	243 C	212 C	110 AB	206
Percent of farms producing:				
Corn	a31	37 C	*12 B	35
Oats	a1	a5	a7	a5
Soybeans	a26	44 C	*11 B	40
Cattle	*5 BC	48 AC	96 AB	48
Wheat	*9 BC	73 AC	89 AB	70
Hay	a2 B	22 AC	a7 B	20
Operator occupation (*percent*):				
Farming	*68	76 C	96 B	77
Nonfarm	a29	*17 C	a4 B	17
Retired	a3	a7 C	0 B	*6
Operator age (*mean*)	50	53	56	53
Less than 50 (*percent*)	*56	39	a40	40
65 or more (percent)	a29	21	a30	22
Operator education (*percent*):				
High school	96 B	84 AC	95 B	86
Completed college	a4 B	*25 A	a24	*23
Farm organization (*percent*):				
Sole or family proprietor	88	85 C	93 B	86
Partnership	a5	11 C	a4 B	10
Family corporation	a7	*4	a3	4
Gross cash income per farm (*dollars*)	*67,118 BC	217,545 A	195,783 A	203,987
Crop cash receipts	*28,941 B	131,954 AC	50,642 B	117,370
Livestock cash receipts	*1,835 BC	23,844 AC	*105,297 AB	28,616
Government payments	*12,574 BC	29,976 A	24,895 A	28,203
Direct	*6,771 BC	17,620 A	15,613 A	16,607
CCP and LDP	*2,887 B	5,110 A	a3,710	4,824
CRP, WRP, and EQIP	*355 B	867 A	a616	806
Other	a2,561 B	6,380 A	a4,956	5,966
Federal crop insurance indemnities	*14,040	10,519 C	*4,774 B	10,337
Cash production expenses	*48,508 BC	155,461 A	*149,139 A	146,552
Net cash income	a18,610 BC	62,084 A	46,644 A	57,436
Net farm income	a11,658 B	59,657 AC	a21,799 B	52,863
Farms with government payments (*percent*)	*72	93	95	92
Farms with Federal crop insurance (*percent*)	*45	62	*42	59
Household income per farm family (*dollars*)	*47,021 B	74,755 AC	*45,765 B	70,237
Farm income	a15,668 B	38,668 A	a20,129	35,362
Off-farm income	31,353	36,087	*25,636	34,875
Earned income from business or job	*22,174	27,760	*16,745	26,435
Percent with off-farm business or job	69	71	*39	68

Coefficient of Variation = (Standard Error/Estimate) x 100. * indicates that CV is greater than 25 and less than or equal to 50. a indicates that CV is above 50. A, B, and C indicate significant column differences based on *t*-statistics at a 90-percent confidence level or higher.
Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service,
2003 Agricultural Resource Management Survey.

Appendix table 6

Characteristics of U.S. barley farms and their operators, by specialization in barley, 2003

Item	Specialized (A)	Nonspecialized (B)	Farm-use-only (C)	All
Number of farms	*1,707 BC	15,538 AC	11,801 AB	29,046
Percent of farms	6	53	41	100
Percent of barley value	20	72	8	100
Feed grains as percent of value of production	77 BC	18 AC	2 AB	15
Barley	77 BC	13 AC	0 AB	11
Total operated acres per farm	*1,123 B	1,881 A	*1,335	1,615
Owned and operated acres	*610	875	*985	905
Harvested barley acres	*426 C	192 C	34 AB	142
Percent of farms producing:				
Corn	a1 BC	32 AC	51 AB	38
Oats	D	17 AC	34 AB	23
Soybeans	a0 BC	21 AC	37 AB	26
Cattle	*16 BC	50 AC	94 AB	66
Dairy	D	*7 AC	43 AB	21
Wheat	*31 B	67 AC	33 B	51
Hay	36	35 C	*19 B	29
Operator occupation (*percent*):				
Farming	67	84	79	81
Nonfarm	a27	*9	*19	14
Retired	a6	a7	*2	*5
Operator age (*mean*)	55	54	53	53
Less than 50 (*percent*)	*37	40	37	39
65 or more (percent)	*27	20	*16	19
Operator education (*percent*):				
High school	99 BC	93 AC	85 AB	90
Completed college	*11 B	25 A	*18	22
Farm organization (*percent*):				
Sole or family proprietor	76	77	84	80
Partnership	a8	9	*12	10
Family corporation	a15	12 C	*4 B	9
Gross cash income per farm (*dollars*)	*137,734 B	269,378 AC	175,297 B	223,420
Crop cash receipts	*71,711 B	155,317 AC	*21,434 B	96,010
Livestock cash receipts	5,561 BC	42,629 AC	131,934 AB	76,735
Government payments	*16,430	24,529 C	13,529 B	19,584
Direct	*7,477 B	13,150 AC	4,131 B	9,152
CCP and LDP	*995 B	2,973 AC	976 B	2,043
CRP, WRP, and EQIP	*4,548 C	1,763	a1,210 A	1,702
Other	*3,449 BC	6,643 A	7,212 A	6,686
Federal crop insurance indemnities	*7,639 C	8,285 C	878 AB	5,237
Cash production expenses	*113,493 B	203,594 AC	137,993 B	171,648
Net cash income	*24,241 B	65,784 AC	37,304 B	51,772
Net farm income	*15,117 B	54,359 AC	31,959 B	42,953
Farms with government payments (*percent*)	77	89 C	71 B	81
Farms with Federal crop insurance (*percent*)	*31	37 C	*18 B	29
Household income per farm family (*dollars*)	*55,315	69,876 C	49,007 B	60,471
Farm income	a7,086 B	36,905 AC	*15,327 B	26,314
Off-farm income	*48,229	32,970	33,680	34,158
Earned income from business or job	*37,764	21,868	24,492	23,876
Percent with off-farm business or job	73	64	70	67

Coefficient of Variation = (Standard Error/Estimate) x 100. * indicates that CV is greater than 25 and less than or equal to 50.
[a] indicates that CV is above 50. D=Data insufficient for disclosure. A, B, and C indicate significant column differences based on *t*-statistics at a 90-percent confidence level or higher.
Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service, 2003 Agricultural Resource Management Survey.

Appendix table 7

Characteristics of U.S. oat farms and their operators, by specialization in oats, 2003

Item	Nonspecialized (A)	Farm-use-only (B)	Total
Number of farms	24,028 B	44,712 A	69,877
Percent of farms	34	64	100
Percent of total oat value	55	43	100
Feed grains as percent of value of production	18 AC	8 AB	13
Corn	14 AC	7 AB	10
Oats	2 AC	0 AB	1
Total operated acres per farm	834 B	545 A	638
Owned and operated acres	483	*363	400
Harvested oat acres	40 B	19 A	27
Percent of farms producing:			
Corn	77 B	57 A	63
Barley	*10	*10	10
Soybeans	55 B	24 A	34
Cattle	69	78	73
Dairy	21 B	40 A	33
Wheat	39 B	21 A	27
Hay	41 B	*16 A	26
Operator occupation (*percent*):			
Farming	76	63	67
Nonfarm	15	*30	*24
Retired	[a]8	*7	*8
Operator age (*mean*)	56	52	54
Less than 50 years (*percent*)	35	40	38
65 or more (*percent*)	26 B	*13 A	18
Operator education (*percent*):			
High school	86	75	79
Completed college	16 B	6 A	10
Farm organization (*percent*):			
Sole or family proprietor	88	92	91
Partnership	*5	*4	5
Family corporation	*5	*2	*4
Gross cash income per farm (*dollars*)	174,599 B	96,292 A	121,824
Crop cash receipts	62,807 B	15,258 A	31,472
Livestock cash receipts	76,916	66,703	69,130
Government payments	13,985 B	7,627 A	9,710
Direct	6,822 B	2,595 A	4,015
CCP and LDP	1,661 B	973 A	1,202
CRP, WRP, and EQIP	*617 B	235 A	366
Other	4,885 B	*3,824 A	4,217
Federal crop insurance indemnities	3,586 B	707 A	1,685
Cash production expenses	128,209 B	70,538 A	89,416
Net cash income	46,390 B	*25,755 A	32,408
Net farm income	39,818	29,506	32,509
Farms with government payments (*percent*)	85 B	52 A	63
Farms with Federal crop insurance (*percent*)	30 B	12 A	18
Household income per farm family (*dollars*)	58,212 B	43,379 A	49,641
Farm income	*22,434	*14,190	16,901
Off-farm income	35,778	29,189	32,740
Earned income from business or job	24,162	20,626	22,960
Percent with off-farm business or job	61	67	66

Coefficient of Variation = (Standard Error/Estimate) x 100. * indicates that CV is greater than 25 and less than or equal to 50.
[a] indicates that CV is above 50. A and B indicate significant column differences based on *t*-statistics at a 90-percent confidence level or higher.
Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service,
2003 Agricultural Resource Management Survey.

Appendix table 8

Role of selected government payments relative to market revenue for U.S. feed grain sector

Feed grains / Payments and market value	Crop year										
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	Billion dollars										
Corn											
Marketing loan benefits and certificates[1]	0.0	0.0	1.4	2.4	2.6	1.2	0.0	0.1	2.9	4.3	0.0
Production flexibility or direct [2]	1.7	3.4	2.6	2.5	2.4	1.9	2.1	2.1	2.1	2.1	2.1
Market loss assistance or counter-cyclical[2]	0.0	0.0	1.3	2.5	2.5	2.2	0.0	0.0	2.4	3.4	0.0
Value of production	25.1	22.4	18.9	17.1	18.5	18.9	20.9	24.5	24.4	21.0	33.3
Total	26.9	25.7	24.2	24.6	26.0	24.1	23.0	26.7	31.9	30.8	35.4
Sorghum											
Marketing loan benefits and certificates[1]	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.1	0.1	0.0
Production flexibility or direct[2]	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2
Market loss assistance or counter-cyclical[2]	0.0	0.0	0.1	0.3	0.3	0.2	0.0	0.0	0.2	0.2	0.0
Value of production	2.0	1.4	0.9	0.9	0.8	1.0	0.9	1.0	0.8	0.7	0.9
Total	2.2	1.7	1.4	1.6	1.5	1.4	1.1	1.2	1.3	1.2	1.1
Barley											
Marketing loan benefits and certificates[1]	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0
Production flexibility or direct[2]	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Market loss assistance or counter-cyclical[2]	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0
Value of production	1.1	0.9	0.7	0.6	0.6	0.5	0.6	0.8	0.7	0.5	0.5
Total	1.2	1.0	0.9	0.8	0.9	0.7	0.7	0.8	0.9	0.7	0.6
Oats											
Marketing loan benefits and certificates[1]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Production flexibility or direct[2]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Market loss assistance or counter-cyclical[2]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Value of production	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total											
Total feed grains											
Marketing loan benefits and certificates[1]	0.0	0.0	1.5	2.6	2.8	1.2	0.0	0.1	3.2	4.5	0.0
Production flexibility or direct[2]	2.1	3.8	3.0	2.9	2.7	2.2	2.4	2.4	2.4	2.4	2.4
Market loss assistance or counter-cyclical[2]	0.0	0.0	1.5	2.9	2.9	2.5	0.0	0.0	2.7	3.6	0.0
Value of production	28.5	24.9	20.7	18.8	20.2	20.6	22.6	26.4	26.1	22.4	34.9
Total	30.6	28.7	26.8	27.3	28.6	26.5	25.0	28.9	34.3	32.9	37.3

[1]Payments are made to feed grain producers.

[2]Payments are made to owners of feed grain production flexibility contract acres or owners of feed grain base acres who may not necessarily be producing feed grains.

Sources: Market value of feed grains is available from USDA, National Agricultural Statistics Service, *Crop Values* at *http://usda.mannlib.cornell.edu/MannUsda/search.do*. Selected government payments available from USDA, Farm Service Agency, *Feed Grains Fact Sheet: Summary of 2002-2007 Program* at *www.fsa.usda.gov/FSA/newsReleases?area=home&subject=prod&topic=pfs&newstype=prfactsheet&type=detail&item=pf_20030701_insup_en_feedgr03.html*, *Price Support Division Reports* at *www.fsa.usda.gov/FSA/webapp?area=home&subject=prsu&topic=psr* accessed 11/22/06 and CCC Budget Essentials page *FY 2003 CCC Actuals and Commodity Estimates Book for FY 2007 President's Budget* at *www.fsa.usda.gov/FSA/webapp?area=about&subject=landing&topic=bap-bu-cc*.

Appendix table 9

Federal crop insurance for U.S. corn

Year	Planted area	Insured area	Participation rate	Total premium	Premium subsidy	Producer premium	Indemnity	Net indemnity
	Million acres		*Percent*	*Million dollars*				
1995	71.5	60.4	84.5	378.2	207.3	170.9	350.9	180.0
1996	79.2	56.0	70.7	527.0	250.9	276.1	265.1	-11.0
1997	79.5	49.4	62.1	460.9	206.3	254.6	152.2	-102.4
1998	80.2	51.1	63.7	535.3	233.4	301.9	356.8	54.9
1999	77.4	52.5	67.8	603.2	323.5	279.7	363.9	84.2
2000	79.6	56.9	71.5	740.4	330.9	409.5	403.2	-6.3
2001	75.7	55.8	73.7	865.7	492.1	373.6	565.8	192.2
2002	78.9	58.7	74.4	909.7	510.6	399.1	1,260.1	861.0
2003	78.6	59.5	75.7	1,095.9	620.6	475.3	700.5	225.2
2004	80.9	62.1	76.8	1,406.7	795.9	610.9	814.6	203.7
2005	81.8	63.1	77.1	1,266.0	716.3	549.7	698.0	148.3
2006	78.6	62.2	79.1	1,561.6	871.4	690.2	732.1	42.0

Sources: USDA, Economic Research Service, *Feed Grains Database* at www.ers.usda.gov/data/feedgrains/ and USDA, Risk Management Agency, *Summary of Business* at www.rma.usda.gov/data/sob.html.

Appendix table 10

Federal crop insurance for U.S. sorghum

Year	Planted area	Insured area	Participation rate	Total premium	Premium subsidy	Producer premium	Indemnity	Net indemnity
	Million acres		*Percent*	*Million dollars*				
1995	9.4	7.4	78.7	36.2	21.4	14.8	50.7	35.9
1996	13.1	9.8	74.8	71.6	38.2	33.4	66.5	33.1
1997	10.1	6.3	62.4	44.8	22.5	22.3	16.3	-6.0
1998	9.6	6.8	70.8	51.2	25.3	25.9	92.0	66.1
1999	9.3	6.5	69.9	49.6	29.5	20.1	32.0	11.9
2000	9.2	6.4	69.6	49.9	27.1	22.8	87.1	64.3
2001	10.2	7.8	76.5	75.9	46.1	29.8	112.9	83.1
2002	9.6	7.3	76.0	82.4	49.6	32.8	223.4	190.6
2003	9.4	7.1	75.5	87.7	52.6	35.1	167.9	132.8
2004	7.5	5.6	74.7	92.6	55.0	37.6	99.0	61.4
2005	6.4	4.7	73.4	67.3	40.3	26.9	32.1	5.2
2006	6.3	4.4	69.8	72.9	43.2	29.7	88.4	58.7

Sources: USDA, Economic Research Service, *Feed Grains Database* at www.ers.usda.gov/data/feedgrains/ and USDA, Risk Management Agency, *Summary of Business* at www.rma.usda.gov/data/sob.html.

Appendix table 11

Federal crop insurance for U.S. barley

Year	Planted area	Insured area	Participation rate	Total premium	Premium subsidy	Producer premium	Indemnity	Net indemnity
	Million acres		*Percent*	*Million dollars*				
1995	6.7	5.7	85.1	21.9	11.4	10.5	24.7	14.2
1996	7.1	4.8	67.6	24.0	11.8	12.2	13.4	1.2
1997	6.7	4.4	65.7	23.7	11.6	12.1	21.0	8.9
1998	6.3	4.0	63.5	20.0	9.8	10.2	17.4	7.2
1999	5.0	3.5	70.0	16.7	10.6	6.1	26.7	20.6
2000	5.8	3.9	67.2	18.4	10.0	8.4	26.6	18.2
2001	5.0	3.3	66.0	21.1	12.1	9.0	43.3	34.3
2002	5.0	3.4	68.0	26.5	15.3	11.2	59.7	48.5
2003	5.3	3.8	71.7	41.9	23.7	18.2	49.7	31.5
2004	4.5	3.2	71.1	34.3	19.5	14.8	34.6	19.8
2005	3.9	2.7	69.2	30.8	17.4	13.3	29.6	16.2
2006	3.5	2.3	65.7	27.4	15.6	11.8	21.7	9.9

Sources: USDA, Economic Research Service, *Feed Grains Database* at www.ers.usda.gov/data/feedgrains/ and USDA, Risk Management Agency, *Summary of Business* at www.rma.usda.gov/data/sob.html.

Appendix table 12

Federal crop insurance for U.S. oats

Year	Planted area	Insured area	Participation rate	Total premium	Premium subsidy	Producer premium	Indemnity	Net indemnity
	Million acres		*Percent*	*Million dollars*				
1995	6.2	1.6	25.8	5.3	3.3	2.0	7.3	5.3
1996	4.6	1.2	26.1	4.9	2.8	2.1	3.9	1.8
1997	5.1	1.1	21.6	5.1	2.9	2.2	5.1	2.9
1998	4.9	0.9	18.4	4.2	2.4	1.8	2.6	0.8
1999	4.7	0.9	19.1	3.5	2.3	1.2	4.1	2.9
2000	4.5	0.9	20.0	3.3	2.1	1.2	3.0	1.8
2001	4.4	0.8	18.2	3.4	2.2	1.2	3.0	1.8
2002	5.0	1.1	22.0	6.2	3.9	2.3	18.7	16.4
2003	4.6	1.0	21.7	6.6	4.1	2.5	4.9	2.4
2004	4.1	0.9	22.0	5.7	3.6	2.1	5.1	3.0
2005	4.2	0.8	19.0	6.8	4.2	2.6	3.0	0.4
2006	4.2	0.8	19.0	6.0	3.7	2.3	12.7	10.4

Sources: USDA, Economic Research Service, *Feed Grains Database* at www.ers.usda.gov/data/feedgrains/ and USDA, Risk Management Agency, *Summary of Business* at www.rma.usda.gov/data/sob.html.