

# Corn and Soybean Oil Supplies—Adequacy for Biofuels Production

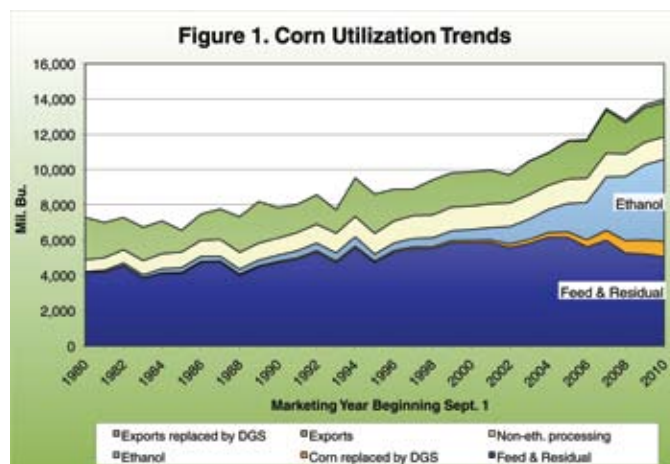
by Dr. Robert Wisner

Barring damage from an early frost, U.S. corn supplies should be fully adequate for foreseeable ethanol processing needs in the year ahead as well as domestic livestock feeding and exports. Very good yield prospects in much of the western Corn Belt more than offset less than ideal conditions in parts of the Midwest east of the Mississippi River and some southern producing areas, where weather problems and late plantings restricted the yield potential. However, final 2009 production numbers will not be known until early January.

U.S. corn processing for ethanol is expected to expand modestly in the 2009-10 marketing year. Several bankrupt ethanol plants have come back on line in the past two to three months and more are expected to follow that path. Lower corn prices have pushed ethanol processing returns modestly into the black, and several new plants have begun operations this year including four in Iowa. Also, early indications are that the Environmental Protection Agency (EPA) may increase the allowable ethanol-gasoline blend for non-flex-fuel vehicles to 12 to 15%, up from the current 10% maximum. That would boost the potential market for ethanol by approximately 20 to 50% from current levels. EPA is scheduled to make its decision by December 1 of this year.

## Non-Ethanol Corn Demand

Other sources of demand for corn will also influence the adequacy of supplies for ethanol. Domestic livestock and poultry feeding traditionally has been the largest source of demand for the U.S. corn crop although it is rapidly being overtaken by corn processing. For more than a year, the domestic pork, beef, poultry, and dairy industries have been under severe economic stress as this sector has attempted to adjust to the higher level of feed costs than in previous years. Sooner or later, severe losses are likely to bring reduced livestock feeding, with resulting tighter meat supplies pushing up livestock product prices at both the farm and retail levels. At this writing, a slight reduction in aggregate grain-fed livestock and poultry numbers appears to be developing. However, reduced numbers are expected to be slightly more than offset by reduced feeding of grain sorghum and possibly less wheat feeding next summer as well as potential increases in marketing weights for some animals. Reduced availability of grain sorghum likely will have a slight positive impact on demand for corn for feed. The long-term upward trend in U.S. corn feeding ended in 2005-06 and has since turned downward (See Figure 1). A portion of the decline in the last three years has been offset by increased distillers grain feeding.



Exports are the other major source of demand for U.S. corn, and typically have been the most volatile demand component. Major competitors of U.S. corn in world markets are feed wheat and South American corn. Major sources of feed wheat exports include the European Union (EU) and former Soviet republics. These competing supplies of wheat and corn both are likely to be down substantially from last season. Even so, U.S. supplies are expected to be adequate to meet increased export market demand, with ending carryover stocks (supply remaining at the end of the marketing year) of corn next summer remaining near this year's level.

## More Detail on Developments Affecting Feed and Export Demand for U.S. Corn

Figure 1 shows the trend in corn feed and residual use as well as other uses of U.S. corn. Residual use is handling losses and a possible small amount of unknown statistical error. Feed use is not measured directly but is a residual after subtracting processing and exports from production plus carryover stocks and imports. When replacement of corn by distillers grain is included, equivalent corn use for feed has declined slightly in the last four years. That is a sharp contrast to the long-term upward trend of previous years.

The nation's corn exports have been in a very slight downward trend since reaching the previous record high in 1980-81. Exports of distillers grain are expanding and have replaced a small amount of corn in international markets. The slight downward trend was interrupted temporarily in 2007-08. Note that U.S. corn exports also have shown a long-term pattern of periodic one-year increases in response to temporarily reduced foreign production,

followed by a sharp decline the next year. The 2007-08 marketing year was one of those occurrences, generated in part by major reductions in wheat production and wheat feeding because of adverse weather in Australia, Europe, former Soviet republics, and other areas. Global wheat feeding normally is about 4.2 to 4.4 billion bushels (corn equivalent). In 2007-08 because of widespread adverse weather in major wheat-growing areas, it dropped to an estimated 3.79 billion bushels. That was a drop of about 400 million bushels from the previous year, thus contributing strongly to the surge in U.S. corn exports. With a record world wheat crop the following year, U.S. corn exports declined sharply in 2008-09.

### **Stronger U.S. Corn Exports Likely in 2009-10**

For the year ahead, U.S. corn export demand may again increase sharply. The catalyst this time is an extremely sharp decline in the spring 2009 South American corn harvest. Reduced 2009 corn production in that region was due largely to adverse weather, but high fertilizer costs were a contributing factor as well as credit availability issues, an adverse exchange rate in Brazil, and Argentine government policies discouraging exports. Current estimates indicate combined Brazil and Argentina corn production last spring was down approximately 680 million bushels from the previous year. These two countries are the major competitors of the United States in world corn export markets. The decline in their production last spring was equivalent to 37% of 2008-09 U.S. corn exports. Additionally, wheat exports from the EU and former Soviet republics are projected to decline by about 425 million bushels (corn equivalent) from last season's level. A significant part of that decline is likely to be feed wheat, thus also tending to strengthen the demand for U.S. corn. Other factors adding uncertainty to potential U.S. corn export demand are

- drought this past summer in parts of China's Corn Belt,
- an emerging El Niño weather pattern that increases the Australian Wheat Belt's risk of drought,
- uncertainty over the potential size of South America's spring 2010 corn harvest, and
- the global economic recession.

The recession is expected to slow the long-term growth in demand for corn in overseas markets. In Mid-September, a sizable part of the Brazil and Argentina Grain Belt was still in a drought situation. These indicators point to a sizable increase in export demand for U.S. corn through late winter, although the exact amount is uncertain.

### **Corn Supply-Demand Balance**

Early projections of U.S. corn supplies, use, ending carryover stocks, and possible prices with alternative yields can be seen in our corn/ethanol balance sheet. Using USDA's September corn production forecast (the medium yield column for 2009-10), our projections show U.S. corn carryover stocks (reserve supplies) at a 6.3 week supply, down from a 7.3 weeks supply in the marketing year that ended on August 31, 2009. Normal minimum working stocks needed for feed, processing, and exports at the end of the marketing year would be 4.7 to 5.0 weeks, to supply needs until the new crop is readily available in marketing channels. Corn harvesting in the Corn Belt states typically begins about the end of September or early October, and a short time

lag is needed before the new supply is dispersed throughout the marketing system.

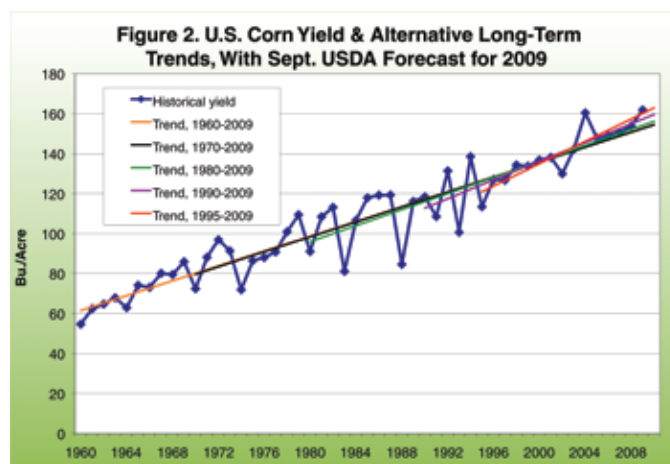
Our balance sheet also shows a very early and tentative look at the potential corn supply and demand for the 2010-11 marketing year with alternative yields. Early projections indicate that with a decline in August 31, 2010 carryover stocks and increased demand for corn for ethanol, a modest amount of additional corn acreage is likely to be needed next spring to meet prospective demand, unless the U.S. 2009 and/or 2010 average yield is significantly above the long-term upward trend. Figure 2 shows alternative long-term U.S. corn yield trends and the September USDA forecast of this year's yield.

### **Adequacy of Fats and Oils for Biodiesel**

Adequacy of vegetable oils and recycled cooking fats and grease supplies for biodiesel production is somewhat more uncertain than availability of corn for ethanol. Adequacy of supplies will depend on the final size of the U.S. soybean crop and foreign competition from soybeans and other oilseeds, as well as global petroleum prices. U.S. policies that influence the biofuel market also will be very important.

### **World Situation and U.S. Soy Export Demand Potential**

In recent years, South America has been the world's largest exporter of soybeans and soybean products and the major alternative source of supply in world markets. Last spring's soybean harvest in this region declined by an estimated 710 million bushels or approximately 19.3 million metric tons, due to severe drought. That is equivalent to 55% of U.S. soybean exports for the marketing year just ended. Brazil and Argentina will be able to offset a small portion of this drop in production by drawing down carryover stocks to bare minimum levels. Sharply reduced production in these two countries and in Paraguay sets the stage for strong U.S. soybean and soybean product exports during the October 2009-February 2010 period, although world demand may be tempered some by the economic recession. Exports from this region from March through September of next year will depend on the size of the crop to be harvested from late February through early April. Early USDA projections indicate the region's production will be 5% higher than two years earlier, with a large part of the increase in Argentina. However, recent developments indicate



the size of the spring 2010 crop is still quite uncertain. As noted above, much of the Soybean Belt in Argentina and southern Brazil is still experiencing drought. Its major planting season is from October to December, so there is still time for improved weather. Also, it was hoped that the Argentine government would lower its 35% export tax on soybeans as a result of a change in the composition of its congress, but so far that has not happened. When farmers are forced to turn over approximately 35% of the price of their soybeans to the government, their incentives for increasing production are greatly reduced.

### **Chinese Demand for Soybeans**

Another important factor is potential Chinese demand for soybeans. China is by far the world's largest importer of soybeans. In the marketing year ended August 31, 2009, it accounted for approximately 56% of U.S. unprocessed soybean exports. Despite the global recession, Chinese purchases of U.S. soybeans increased sharply in the past year. Its reasons for increased purchases included sharply reduced South American supplies; expanding domestic demand for meat, poultry, and dairy products; and a desire to build up reserve soybean stocks as protection against possible future crop problems. Expectations of a weakening U.S. dollar provided further incentives for China to increase its reserve stocks. USDA data indicate China's imports of soybeans from all sources increased by a modest 5% in the marketing year ended August 31, 2009, although imports from the U.S. increased by 40%.<sup>1</sup>

For the first half of the current marketing year, Chinese demand for U.S. soybeans is expected to remain strong. Parts of China's major soybean producing area in key northeast provinces experienced drought this past summer, and that could reinforce its need for continued large soybean imports. By early September, China had already purchased 58% of the amount of U.S. soybeans that it had imported during the entire 2008-09 marketing year.

### **Biodiesel Demand Prospects**

Since the EU's implementation of restrictions on imports of U.S. biodiesel, demand for soy-based biodiesel in the United States has fallen sharply. In the 2007-08 marketing year, USDA reports that the United States used 3.245 billion pounds of soybean oil for biodiesel. For 2008-09 the amount used for biodiesel has dropped to an estimated 1.85 billion pounds, a decline of 43%.<sup>2</sup> For the calendar year 2009, the Energy Independence and Security Act of 2007<sup>3</sup> mandated that 500 million gallons of biodiesel was to be blended into the U.S. diesel fuel supply. If 70% of the biodiesel came from soybean oil, that would create demand for about 2.6 billion pounds of soybean oil. However, the mandate has not been enforced. For the calendar year 2010, the mandate calls for 650 million gallons of biodiesel blending with diesel fuel. With 70% produced from soybean oil, that volume would create a potential demand for about 3.4 billion pounds of soybean oil, nearly double the amount being used this year. Whether this magnitude of demand emerges will depend partly on whether the mandate is enforced and whether Renewable Identification Numbers (RINs) generated this year can be used as substitutes for biodiesel blending next year. White House sources reportedly have indicated that the unenforced 2009 biodiesel mandate

volume will be added to the 650 million gallon mandate for 2010 and will be enforced.<sup>4</sup> If so, with soybean oil supplying 70% of the feedstock for biodiesel, demand for soybean oil for biodiesel could be as high as 6.04 billion pounds in calendar year 2010. However, most analysts are taking a wait-and-see attitude about whether the mandates will actually be enforced in that way. USDA September 14 projections place soybean oil use for biodiesel in the 2009-10 marketing year at only 2.1 billion pounds, up 13.5% from last season. If the mandates are enforced as some Washington sources have indicated, soybean oil supplies could be much tighter and prices much higher than now indicated.

### **Competing International Vegetable Oil Supplies**

At the global level, competition from other vegetable oils may increase modestly this season, depending on the size of next spring's South American soybean crop. USDA's Foreign Agricultural Service projects that world production of palm oil and rapeseed oil will both increase by about 5% in the year ahead. Demand for vegetable oils for food has a long-term upward trend, especially in eastern Asia where consumer incomes have grown rapidly in recent years. Modest growth in foreign biodiesel production and use appears also likely, assuming that crude petroleum prices gradually increase as the world economy begins to show signs of recovery. If so, that and the long-term upward trend in consumption for food in developing nations will contribute to modestly increased global demand for soybean oil and other vegetable oils.

USDA projects that global carryover stocks of palm oil, rapeseed oil, and soybean oil will decline slightly by the end of the current marketing year.

### **Uncertainty on U.S. Soybean Crop Size**

A major part of the U.S. soybean crop was planted unusually late this year, especially in the northern Great Plains and the Midwest east of the Mississippi River. An unusually cool summer, including record or near-record low July temperatures and a cool August in most of the Midwest, contributed to slower than normal growth. On August 10, only 55% of the crop in major producing states was setting pods, compared with the 5-year average of 72% and 57% last year. For much of the Midwest, that left only about 3 to 4 weeks to complete the reproduction cycle before changing length of daylight pushed the crop into maturity. Last year's U.S. average soybean yield was placed at 39.6 bushels per acre. Based on field observations and a large-scale farmer survey at the end of August and the first few days of September, USDA's National Agricultural Statistics Service forecast this year's U.S. yield at 42.3 bushels per acre, up 2.7 bushels per acre or 7% from last year.

Last year's August USDA forecast of the U.S. soybean yield (also a late-planted crop) was 40.5 bushels per acre. Its September estimate was 40.0 bushels per acre, but the final yield estimate was 39.6 bushels per acre. Last year's exceptionally late first frosts across the Midwest kept yields from being lower.

With the lateness of the crop again this year, the final potential yield is a bit more uncertain than usual. If the yield would be 1.0 to 1.5 bushels per acre below the current USDA forecast, U.S. soybean and soybean oil supplies could be quite tight for the year ahead. That, in turn, would tend to support soybean oil

prices and might limit the amount of soybean oil being used for biodiesel unless biodiesel mandates are strictly enforced.

In each of the last three late-planted years, the soybean yield was well below a long-run trend yield, which is 42.1 bushels per acre for 2009 (See Figure 3).

### Export Demand Uncertainty

Demand for U.S. soybeans is heavily influenced by the size of foreign crops—primarily in South America—and the rate of growth in consumer incomes in major soybean markets. The most important of these markets is China, which in the marketing year just ended is estimated to have accounted for 53% of global soybean imports. As we noted earlier, China's purchases of 2008-crop U.S. soybeans increased by about 40% from a year earlier, although its imports from all sources increased by a much more modest 5%. The most important reason for the increase in U.S. purchases appears to have been due to the decline in availability from South America.

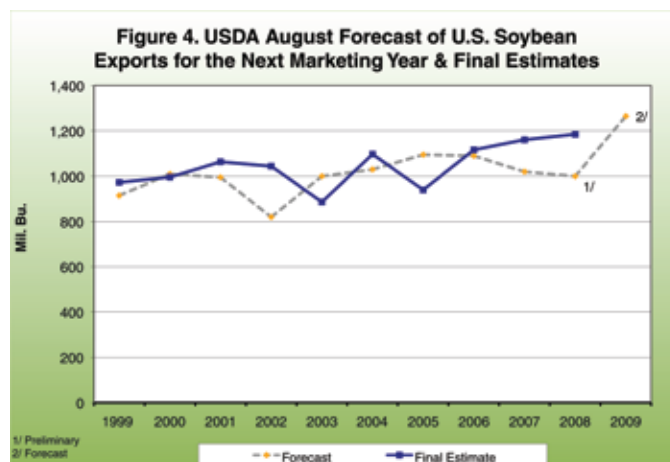
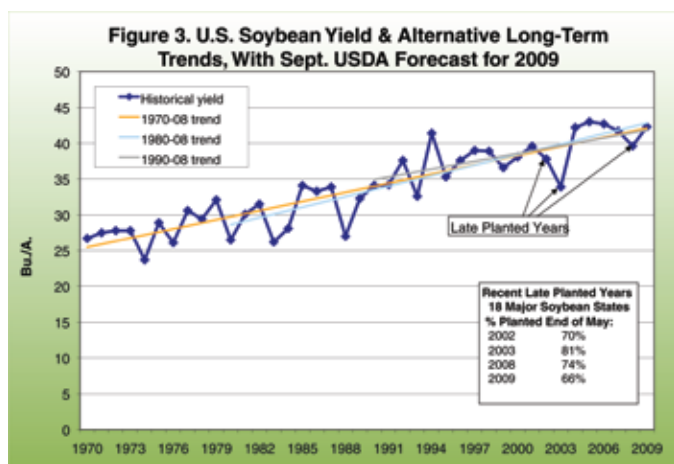
Figure 4 indicates that in recent years it has been a challenge to anticipate the growth rate for U.S. soybean exports. The dashed line shows USDA's August forecast of U.S. soybean exports for the upcoming marketing year, and the solid line shows the final export numbers for the marketing year. The final 2008-09 data are not yet available, but based on export shipments through the end of August, they are expected to substantially exceed last year's August forecast.

### Soybean Balance Sheets

U.S. soybean supply-demand projections for the year ahead and very tentative alternative projections for 2010-2011 are available on our soybean balance sheet (found at <http://www.extension.iastate.edu/agdm/crops/outlook/soybeanbalancesheet.pdf>). The medium-yield supply projections use the USDA September crop forecast. Our export projections are modestly higher than those from USDA's World Agricultural Outlook Board. If our projections materialize, August 31, 2009 U.S. soybean carryover stocks will be at about a 3.3 weeks' supply vs. a preliminary figure of 1.4 weeks for the marketing year just ended.

### Conclusions

It looks almost certain that U.S. corn supplies will be fully adequate to meet expanding ethanol demand in the year ahead as



well as a possible small increase in corn use for livestock feed and a probable sharp increase in U.S. corn exports. Whether supplies are just adequate or ample will depend on the timing of the first killing frosts this fall in the Midwest, the size of the South American corn crop harvested next spring, and whether EPA allows intermediate ethanol-gasoline blends of E-12 to E-15 to be used for non-flex-fuel vehicles. A modest amount of additional corn acreage may be needed next spring to meet expanding demand for ethanol.

Soybean supplies at this writing look adequate to meet foreseeable food, feed, industrial, and export demand for the year ahead while allowing for a modest expansion in biodiesel production. However, there appears to be more uncertainty in the soybean supply-demand balance than for corn, due to lateness of the U.S. crop, historical challenges in predicting export demand, uncertainty about the degree of recovery in next spring's South American crop, and uncertainty about how U.S. government biodiesel mandates will be enforced in 2010. One or more of the following three developments could significantly tighten soybean and soybean oil supplies for the year ahead:

- significant frost damage to the U.S. crop,
- continuing drought in South America into January 2010, and/or
- aggressive enforcement of U.S. government biodiesel mandates, including combining the 2009 un-enforced volume with the mandated 2010 volume.

### References

1. Foreign Agricultural Service, USDA, Archived Export Sales Report for September 3, 2009 and World Agricultural Outlook Board, World Agricultural Supply-Demand Report, September 11, 2009.
2. Economic Research Service, U.S. Department of Agriculture, Oil Crops Outlook, OCS-09i, September 14, 2009.
3. Energy Independence and Security Act of 2007, PL 110-140, December 19, 2007, Subtitle A, Renewable Fuel Standard, Sections 201-210.
4. Ann Davis and Russell Gold, "US Biofuel Boom Running On Empty", *Wall Street Journal*, August 27, 2009.

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