



# Ag Decision Maker



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### Will there be enough corn to supply future needs?

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*(first in a series of three)*

**F**or decades U.S. corn growers have faced excess production capacity and government farm programs designed to avoid surplus supplies. But for the next several years, the industry may be facing a different situation. Many grain industry analysts anticipate that, rather than surplus production capacity, the corn and feed grain industry's challenges will be how to ration limited supplies among various users and how to increase U.S. corn production.

A major driving force in this emerging situation is the emphasis on environmentally-friendly renewable fuels. Another driving force is widespread anticipation that China's role as the world's No. 2 or No. 3 corn exporter may be coming to an end. There is

little uncertainty about the upward trend in ethanol fuel production. However, future trends in Chinese corn trade are less clear.

#### Emerging supply-demand picture

American farmers harvested a record corn crop in 2003 that was insufficient to fill market requirements. The result was a sharp drawdown of U.S. and foreign feed grain carryover stocks. For the year ahead, official projections in June indicated U.S. farmers are likely to harvest an exceptionally large corn crop (815 million bushels above 2003) that will be only a little larger than market requirements. The 2004 crop projections reflect the earliest planting season ever recorded. With good weather through harvest, the early plantings are expected to contribute to record yields. Based on a decline in total

planted cropland acreage in the last several years, U.S. corn planted acreage shows signs of approaching an upper limit.

**Ethanol** — Meanwhile, continuing a trend that has been in place for the last few years, 12 new corn processing plants for producing fuel ethanol are under construction. Fourteen new plants were constructed in 2002-03. At least 60 other new plants are being planned and are expected to break ground in the next two or three years. Plants yet to begin construction likely will have the potential to process more than one billion bushels of corn into ethanol.

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Rapid growth of the ethanol industry has been encouraged by low corn prices, as well as environmental regulations and state and federal policies. The energy bill, not yet passed as this article is being written, will likely reinforce the rapid upward trend in ethanol production. The trend is expected to propel production to at least 4.8 billion gallons of fuel ethanol by 2008. By that time, combined domestic processing of corn for ethanol and other uses will likely exceed 3.3 billion bushels annually. Plants currently in the planning stage could even push processor demand 200 to 400 million bushels above this level.

While ethanol production generates a significant amount of Distillers Grain and Solubles (DGS) to substitute for corn and soybean meal, about 70 percent of the original weight of corn is consumed in producing ethanol and is no longer available for feed or other uses.

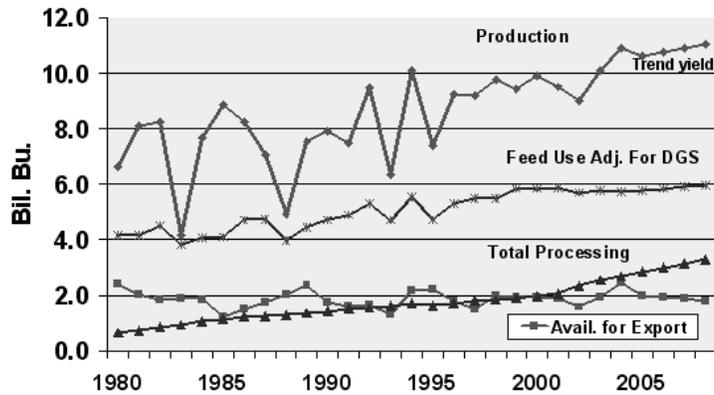
**China** — If China shifts from its traditional position as the No. 2 or No. 3 corn exporter in the world and becomes a net importer, substantially increased U.S. corn export demand can be anticipated in the years ahead. In this case, the world market would attempt to replace Chinese corn with U.S. corn. If so, a major question facing the U.S. will be how to get enough corn to supply the needs of all users.

**Demand trends**

Figure 1 shows recent trends in corn utilization and likely trends for the years ahead. Domestic corn feeding has increased for decades. The projections to 2008 are based on a continuation of that trend, but with corn feeding adjusted downward to reflect the increased supply of distillers grain and solubles (DGS) that will be used to replace corn. We assume 40 percent of the DGS will replace soybean meal and 60 percent will replace corn in livestock and poultry rations.

The projected corn processing volume represents a modest reduction in the recent growth rate. Much of the growth is in corn processing

Figure 1. U.S. Corn Production, Domestic Use, & Availability for Exports--Projections to 2008



for fuel ethanol. This component of demand in 2004-05 is projected to account for 1.37 billion bushels. By 2008-09, corn processing for ethanol is projected to exceed 1.9 billion bushels, supplying the equivalent of 3.7 percent of the nation's recent gasoline consumption. Total corn processing for all purposes is projected to reach 3.3 billion bushels by 2008-09.

Production is projected based on June 30, 2004 estimated acreage and a continuation of the long-term upward trend in yields. The remaining line on the graph is a residual, the amount of U.S. corn available for export if potential domestic demand is filled first. Note that the amount of corn **available** for export, under these assumptions, peaks in 2004-05 at 2.1 billion bushels and declines to 1.8 billion by 2008.

Again note the key assumptions behind this conclusion are:

- U.S. corn acreage remains constant at the estimated 2004 level
- The U.S. average corn yield exactly equals the long-term trend yield every year
- Growth in corn procession slows slightly from the growth rate of the last two years.
- Corn processing continues to expand no faster than the rate of the last two years
- U.S. corn carryover stocks stabilize at the currently projected 2005 level (11 percent of annual use)

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- Domestic corn feeding, adjusted for DGS usage, continues to expand at the same rate as in the last 15 years
- The domestic feed and processing industries will be able to bid corn away from foreign buyers.

If all plants currently being planned materialize, corn processing for ethanol would exceed these projections and would reduce the amount of corn available for export by 20 to 25 percent from USDA's projected 2004-05 exports—unless corn production is above trend yields shown here.

**Acres and production trends**

The assumption in most recent ethanol plant construction has been “If you build it, corn will come to the plant.” However, current trends suggest it is important to examine the validity of this assumption. Figure 2 shows that planted acreage of major U.S. grains, cotton, and soybeans since 1997 has declined by 9.3 million acres. This reduction reflects urbanization and government incentives to take farmable wetlands and filter strips along streams out of production.

**Acres Trend** — Based on USDA's June 30, 2004 planted acreage report, Figure 3 shows that U.S. corn plantings since 1997 have increased by 1.5 million acres. Soybean plantings increased by 4.8 million acres while combined plantings of wheat, other small grains, cotton, and sorghum have decreased by 15.6 million acres over the same period. Declining production of other small grains and sorghum has increased corn feed demand.

The nation's cropland base appears likely to continue a slow downward trend unless environmental programs such as the long-term Conservation Reserve Program (CRP) and wet-land programs are relaxed. To the contrary, there are discussions of increasing the amount of cropland in the Conservation Reserve Program to 39 million acres, up from its current 32 million acres.

**Yield Trend** — Soybean yields have declined slightly in the last decade. For the last eight years, the nation's corn yield has moved right along the long-term upward trend line—except for the drought year, 2002. Relatively stable weather and improved production technology have made U.S. corn yields less variable in the last several years than in the 1980s and early 1990s. In contrast, soybean yields in the last decade have been limited by nematodes, aphids, leaf beetles, and a number of diseases.

More rapid growth in corn yields than in soybeans may set the stage for a shift of acreage from soybeans to corn. Such a shift, however, is likely to be gradual and tempered by agronomic and economic advantages that come from a corn/soybean rotation.

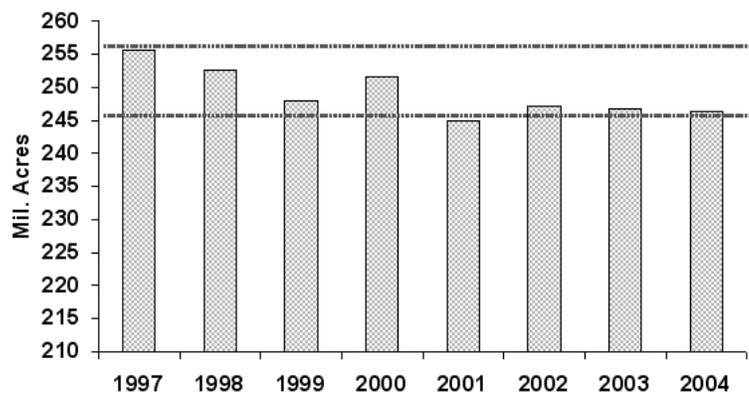
In the extreme weather years of the late 1960s through mid-1990s, yields fluctuated widely from year to year. With current trends in corn use and absence of reserve supplies, similar years would create major problems for much of the grain/livestock and ethanol industries.

**Can corn acreage be increased to accommodate growing demand?**

With the long-term downward trend in total U.S. planted acreage of major crops, increased corn plantings almost certainly would need to come from reduced plantings of soybeans and/or from the long-term Conservation Reserve

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**Figure 2. Total Planted Acreage of Major U.S. Grains, Cotton, and Soybeans, 1997-2004**



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Program (CRP). Approximately 5 to 6 million acres of the CRP could be used for corn production, although the exact amount is uncertain because some has been reforested.

At the global level, soybean production has expanded rapidly in South America. The 2004 and 2005 crop years will be tests of whether Asian Rust will have a lasting impact on South American yields. Soybean yields this past spring were below normal in southern Brazil, Argentina, and parts of neighboring countries because of drought. In areas further north in Brazil, yields were sharply reduced by excessive rain and Asian Rust. Agronomists believe that with less rainfall, the disease can be controlled effectively by spraying. If so, soybean production almost certainly will continue to expand in South America for the foreseeable future. That will permit a continued decline in the U.S. share of world soybean production and exports.

Thus, stagnant U.S. soybean yields, rapidly growing domestic demand for corn, and extra costs to treat soybean pests including aphids, various diseases, and possibly Asian Rust may encourage a modest shift of U.S. soybean acres to corn. The speed of this shift also will depend on whether the U.S. bio-diesel industry develops as a major source of diesel fuel. Soybeans are the main potential feedstock for U.S. bio-diesel production. Forthcoming Environmental Protection Agency clean-air regulations for elimination of sulfur emissions from diesel engines and bio-fuels tax incentives are expected to accelerate demand for U.S. bio-diesel fuel.

**Driving forces behind corn demand**

The major drivers behind corn demand are domestic feed demand, domestic non-feed demand and export demand.

**Domestic Feed Demand** — Demand for corn for domestic livestock feeding has trended upward for decades in response to increased consumer incomes and increased demand for meat. The Atkins diet also has recently contributed to this trend. However, some health professionals are now warning the public of likely long-term health problems associated with that

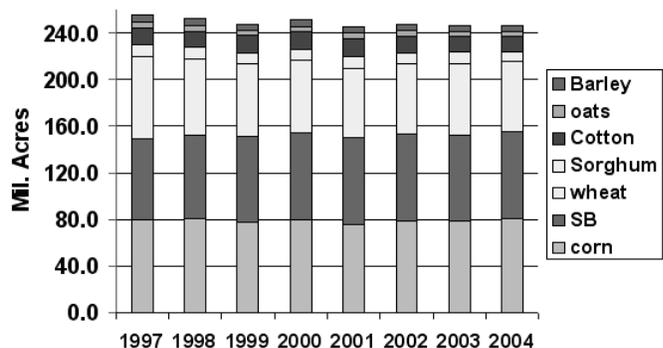
diet. Expanded meat exports, driven by similar forces, have allowed the U.S. livestock sector to export grain in the form of value-added products. Foreign environmental challenges in producing livestock, especially in densely populated Japan, Korea, Taiwan, and neighboring countries indicate this source of demand will expand in the years ahead.

**Domestic Non-Feed Demand** — In domestic non-feed markets, processing corn for fuel ethanol has recently been the major source of growth, but processing for other uses also is increasing. Ethanol is used to produce ETBE, an oxygen-enhancing additive needed to meet EPA clean air requirements in large cities. Phase-out of MTBE in the last two years has caused California and several other large urban areas to turn to ETBE, the only currently available alternative for meeting EPA reformulated fuels requirements. MTBE was phased out because of its carcinogenic properties. For the future, ethanol also is seen as a potential source of hydrogen for automotive fuel cells.

**Export Demand** — Exports are the most volatile component of the demand for corn. While long-term agricultural economic models have consistently indicated that U.S. corn exports will trend upward in future years, exports have been in a down trend for nearly a quarter of a century. If the downward trend continues, the U.S. will likely have enough corn to supply the growing ethanol demand for the next few years. However, China is a key vari-

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**Figure 3. U.S. Planted Acreage of Major Grains, Oilseeds, and Cotton**



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able in long-term U.S. corn export prospects. China has been the second or third largest corn exporter in the world for most years since the early 1980s. Available data indicate its corn stocks have fallen sharply in the last four years. With its entry into WTO, many government and industry analysts expect China to cut its corn exports to zero and become a net corn importer.

This same expectation has surfaced in the past, especially in 1994-95 and 1995-96 when China temporarily became a net corn importer. However, in 1996-97, China reverted to its role of a large corn exporter. Failure of nearly a decade of projections that China would shift from exporter to importer suggests caution in looking ahead. If the projected shift occurs, foreign grain users will call upon the U.S. to fill corn

needs historically supplied by the Chinese. This scenario would trigger a potential increase in U.S. corn export demand from 2003-04 levels of 300 to 600 million bushels.

By 2008, even with corn yields following the long-term upward trend and setting new record highs every year, that would create the need for 4.5 to 6.0 million more corn acres than farmers planted in 2004. These acres, if taken from soybeans, could reduce U.S. soybean plantings by up to five to eight percent from current levels. That projection also is assuming that expansion in ethanol processing does not exceed the growth rate of the last two years. Planned construction of at least 54 additional plants suggests the rate of expansion may significantly exceed that rate.

## China: Will they or won't they?

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One of the perennial unanswered questions in agricultural trade is, "What are China's intentions?" Will China become a major importer of grains and seeds or will it seek to continue its record of relative agricultural self-sufficiency? This question has generated additional consideration since China's accession to the World Trade Organization and the anticipated opening of its markets to world trade.

A June 1, 2004, the Guardian Unlimited headline proclaims "Lula seals deal to feed China's cities with Brazilian soy in return for infrastructure investment." The article notes that Brazilian president, Luiz Inacio Lula da Silva, and a delegation of more than 450 political and business leaders met with Chinese officials to ink a number of trade deals designed to benefit both countries. While the details of the negotiations were not spelled out, it is clear that Brazil intends to pay for Chinese infrastructure investments with exports of iron ore, uranium and soybeans.

On the same day, I read a report in "Doane's Agricultural Report" giving highlights of the 2004 World Agricultural Forum. One of the highlights focused on China and what was reported as its changed definition of agricultural self-sufficiency. In the past, China's goal of self-sufficiency has focused on domestically producing all of the food it consumes. The new definition defines self-sufficiency as the "combination of domestic production and export earnings from high-value fruit and vegetable production." It has been argued that China, with its low labor costs, would be better off concentrating its efforts in labor intensive crops like fruits and vegetables, importing land extensive crops like grains and seeds.

Both of these news items are consistent with the stories and largely unrealized projections we have seen since at least the time of the adoption of the 1996 Farm Bill. For nearly ten years these projections have shown ever-increasing imports by China. In the past, the rationale was not

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adjustment shifts brought about by WTO, but the need for imported grains to feed animals to provide a growing middle class with meat.

On the other hand, in May the USDA revised its estimate for China's corn stocks for the second time in less than four years. Once again the level of grain stocks was increased to account for China's continued corn exports. Without the revision, China would have been exporting corn that USDA estimates said it didn't have.

While I was thinking about these issues, I learned about some research being conducted by Yu Zhang, one of our graduate students here at the University of Tennessee. She found a 2003 survey of the attitudes of Chinese consumers toward the issue of self-sufficiency (Food Security Module China). Almost every Chinese believes in food security that is based on self-sufficiency. Zero percent of the urban respondents said they wanted China to rely on food imports. Similarly only 3.3 percent of rural residents indicated that they would be comfortable relying on imports. Zhang said that food self-sufficiency is deeply imbedded in Chinese culture going back centuries, if not a millennium or more.

The feelings of Chinese consumers are reflected in the comments that Zhou Ming Chen, Chairman of the China National Cereals, Oils, and Foodstuffs Import and Export Corp., made in a presentation on February 17, 2004 in Washington D.C. In that address he said "China attaches great importance to agricultural development and increasing the income of farmers. It is inconceivable that a country of 1.3 billion people will rely on others to feed themselves."

This commitment to self-sufficiency was fleshed out with China's of launch a new agricultural policy at the beginning of 2004. This "Number One Central Government Document" comes 18 years after the last number one agricultural policy. The policy commits significant funds to increasing farmers' income and living standards and ensuring food security. The document calls for increased agricultural research, increased mechanization of Chinese agriculture, support of rural incomes, the availability of capital and credit in rural areas, and policies to support grain production and processing.

Only time will tell whether China will live up to the expectations of those anticipating agricultural prosperity based on large exports to China or continue its centuries-long commitment to agricultural self-sufficiency.

**... and justice for all**

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