# Chapter 5.  Grain and Feed

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In the past few years, the demand for grains and oilseeds was growing relative to supplies, with inventories declining.  The sharp downturn in the world's economies has brought a different focus on the demand side of commodity markets, at least for the short run.  The slowing growth in consumers' incomes is reflected in the demand for commodities.  This year, more than most, uncertainty about prices is related to uncertainty about the future demands for commodities.

This chapter provides a status report on available supplies and the expected demands for wheat, corn, and soybeans.  It is necessarily a snapshot based largely on the supply-demand estimates available as of November 10, and with a fluid, dynamic economy, this snapshot could change substantially.

## Wheat

Wheat production in the U.S. in 2008 was 2.5 billion bushels, 433 million bushels above last year and almost 700 million above the low of two years ago (Table 5-1).  Production was larger for most classes of wheat, including hard winter and spring wheats, and also soft red and white wheats.  Global wheat production is projected to be a record 682 million metric tons, and world rice production is forecast to be 434 million metric tons, up slightly from 2007-08 and up about 13 million tons from 2006-07.  Hence, food grain supplies appear adequate for the world as a whole.

With larger supplies, the USDA is projecting somewhat larger uses of wheat for domestic food consumption and for exports.  U.S. exports will be influenced by competition from other wheat-producing countries and by the relationship of the U.S. dollar to other currencies.  Considerable uncertainty exists about the export demand for U.S. wheat this year.  Given the USDA supply-demand estimates, ending inventories are expected to double from 306 to 603 million bushels on June 30, 2009.  Thus, inventories are expected to return to near normal levels (26% of annual use).

In this context, the USDA projection of a farm-level, marketing-year average price of $6.85 per bushel is perhaps a bit high.  Their estimate does reflect that a considerable portion of the wheat harvest was sold in July and August at high prices.  But, prices of wheat (and other commodities) have dropped sharply since summer.  As of November 10, the prices for futures contracts for wheat on the Chicago Board of Trade ranged from $5.21 for December 2008 delivery to $5.56 for May 2009 delivery.  Prices received by the typical farmer would be less than these futures prices.

The futures market does expect wheat prices in forthcoming marketing years to be higher than this year.  Thus, the harvest-time (July) price for 2009 is $5.70, for 2010 $6.29, and for 2011 $6.58 per bushel.  These prices are, of course, subject to much change as time evolves and new information arrives, but traders in futures markets are clearly expecting upward pressure of demand on supply in future years.

## Corn

The corn harvest this Fall in the U.S., at 12.0 billion bushels, is over one billion bushels less than in 2007-08 (Table 5-2), though still the second largest crop on record.  (The average yield of 153.8 bushels per acre is also the second largest on record.)  The smaller U.S. crop is reflected in a lower estimate of world output (Table 5-3).

| TABLE 5-1. U.S. SUPPLY AND DEMAND BALANCE SHEET FOR WHEAT[a] | | | |
|---|---|---|---|
| | 2006-07 | 2007-08E | 2008-09F |
| Supply: | | | |
| Harvested Acres (million) | 46.8 | 51.0 | 55.7 |
| Yield (bushels per acre) | 38.7 | 40.5 | 44.9 |
| | | (Million Bushels) | |
| Beginning Stocks | 571 | 456 | 306 |
| Production | 1,812 | 2,067 | 2,500 |
| Imports | 122 | 113 | 100 |
| Total Supply | 2,505 | 2,635 | 2,905 |
| Use: | | | |
| Food | 938 | 948 | 960 |
| Seed | 82 | 88 | 82 |
| Feed & Residual | 121 | 30 | 260 |
| Total Domestic Use | 1,140 | 1,066 | 1,302 |
| Exports | 908 | 1,264 | 1,000 |
| Total Use | 2,049 | 2,330 | 2,302 |
| Ending Stocks | 456 | 306 | 603 |
| Stocks/Use Ratio | 22.3% | 13.1% | 26.1% |
| Avg. farm price, U.S., $bu. | 3.42 | 6.48 | 6.85 |
| Avg. farm price, NYS, $bu. | 3.34 | 6.75 | - |

[a]Data from USDA, "World Agricultural Supply and Demand Estimates," (November 10,2008) WASDE-464, P. 11.

The smaller supply is offset, in part, by the expectation of smaller demands for feed use and exports. Ethanol use is forecast to grow from last year to this year, although the November estimate is 100 million bushels less than forecast in September. Nonetheless, if the USDA's estimate is correct, ethanol production will use almost one billion more bushels of corn in 2008-09 than in 2007-08. The net result is that the total use of corn is forecast to decline only 200 million bushels, and hence ending stocks on August 31, 2009 will be 500 million bushels less than in the previous August. The stocks-to-use ratio is expected to be 9% on August 31, 2009 compared with 12.7% on August 31, 2008. A ratio of 10% or less is typically bullish for prices, and the USDA is projecting somewhat higher prices for the current marketing year than last.

Figure 5-1 depicts the relationship between the marketing-year average price of corn, for U.S. farmers, and the stocks-to-use ratio at the end of each year. The line shown in the Figure is based on a statistical fit of the data for the 1989-90 through 2005-06 marketing years. The observation for 2006-07 is significantly above the previous average relationship, and the observation for 2007-08 is even further above the historical relationship. Indeed, last year's price of $4.20 per bushel is estimated to be $1.87 higher than it would have been in the old regime, given an ending ratio of 12.7%.

The USDA's forecast of a ratio of 9% and a price of $4.40 per bushel for 2008-09 is consistent with the 2007-08 observation (see Figure 5-1). The corn market (and related markets) appear to be in a new price regime; for any given stocks-to-use ratio, prices are significantly higher than they were under the old regime. If the new regime holds, lower prices will require that the stocks-to-use ratio grows from the current level.

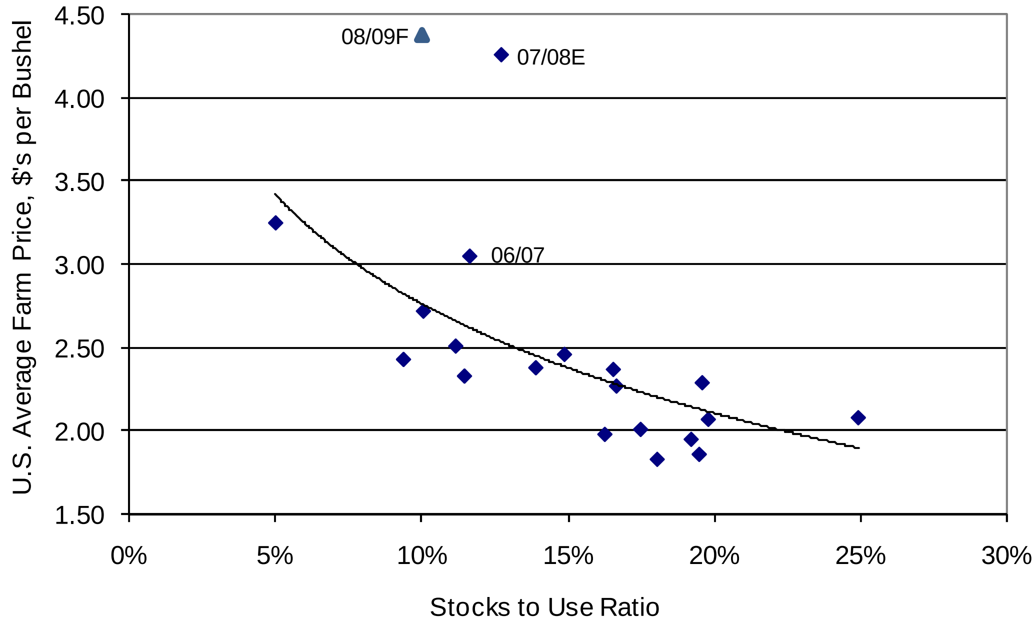
| TABLE 5-2. U.S. SUPPLY AND DEMAND BALANCE SHEET FOR CORN[a] | | | |
|---|---|---|---|
| | 2006-07 | 2007-08E | 2008-09F |
| Supply: | | | |
| Harvested Acres (million) | 70.6 | 86.5 | 78.2 |
| Yield (bushels per acre) | 149.1 | 151.5 | 153.8 |
| | | (Million Bushels) | |
| Beginning Stocks | 1,967 | 1,304 | 1,624 |
| Production | 10,535 | 13,074 | 12,020 |
| Imports | 12 | 20 | 15 |
| Total Supply | 12,514 | 14,398 | 13,659 |
| Use: | | | |
| Feed & Residual | 5,595 | 5,974 | 5,300 |
| Food, Seed and Industrial | 3,490 | 4,364 | 5,335 |
| Ethanol for Fuel[b] | 2,119 | 3,026 | 4,000 |
| Total Domestic Use | 9,085 | 10,338 | 10,635 |
| Exports | 2,125 | 2,436 | 1,900 |
| Total Use | 11,210 | 12,773 | 12,535 |
| Ending Stocks | 1,304 | 1,624 | 1,124 |
| Stocks/Use Ratio | 11.6% | 12.7% | 9.0% |
| Avg. farm price, U.S., $bu. | 3.04 | 4.20 | 4.40 |
| Avg. farm price, NYS, $bu. | 3.42 | 4.30 | - |

[a]Data from USDA, World Agricultural Outlook Board, (November 10, 2008) "World Agricultural Supply and Demand Estimates." WASDE – 464, P. 12.
[b]Ethanol for fuel is included in the food, seed, and industrial category and presented for illustrative purposes.

| TABLE 5-3. WORLD SUPPLY AND DEMAND BALANCE SHEET FOR CORN[a] | | | |
|---|---|---|---|
| | 2006-07 | 2007-08E | 2008-09F |
| | | (Million Metric Tons) | |
| Supply: | | | |
| Beginning Stocks | 124.78 | 108.69 | 126.47 |
| Production | 712.44 | 791.96 | 781.36 |
| Imports | 90.92 | 96.64 | 80.43 |
| Use: | | | |
| Feed, Domestic | 478.29 | 498.39 | 488.02 |
| Total, Domestic | 728.53 | 774.18 | 797.71 |
| Exports | 93.80 | 95.38 | 82.33 |
| Ending Stocks | 108.69 | 126.47 | 110.12 |
| Stocks/Use Ratio | 14.9% | 16.3% | 13.8% |

[a]Data from USDA, World Agricultural Outlook Board, (November 10, 2008) "World Agricultural Supply and Demand Estimates." WASDE – 464

FIGURE 5-1. HISTORICAL RELATIONSHIP BETWEEN CORN PRICES AND THE STOCKS TO USE RATIO, 1989-2008. [a]




A snapshot of futures prices, as of November 10, is provided in Table 5-4. Futures prices at this level–$4.00 to $4.25 for the current marketing year–imply that the USDA's forecast of farm prices for 2008-09 is on the high side. Or, if the USDA forecast is correct, then futures prices should increase from their November 10 level.

TABLE 5-4 FUTURES PRICES FOR CORN, CHICAGO BOARD OF TRADE, NOVEMBER 10, 2008

| Contract Month | - $ per bu. - |
|---|---|
| December 2008 | 3.935 |
| March 2009 | 4.015 |
| May 2009 | 4.1375 |
| July 2009 | 4.2525 |
| September 2009 | 4.360 |
| December 2009 | 4.500 |
| December 2010 | 4.510 |

In sum, the evidence about forthcoming corn prices is mixed. The USDA estimate is consistent with the previous year's supply-demand conditions and with their estimates of expected conditions for the forthcoming year. But, as of this writing, traders in corn futures are expecting lower prices relative to those prevailing last year. Prices for new crop futures (for 2009-10 and 2010-11) are higher than those for this year, implying that traders expect tighter supply-demand balances in future years.

## Soybeans

The area planted to soybeans last spring rebounded about 10 million acres, but yields this year are about two bushels per acre below a year earlier (Table 5-5). The net effect is that soybean production of 2.92 billion bushels is about 250 million bushels larger this year than last. Carryover into the current marketing year was a meager 205 million bushels, and consequently the total supply this year is about 125 million bushels less than a year ago. World-wide production of soybeans is projected to be up around seven percent (Table 5-6).

The USDA expects the combined domestic and export uses of beans to decline by about 125 million bushels, and if these estimates are correct, carryover will again be only 205 million bushels. Since use is projected to be smaller than last year, the stocks-to-use ratio is expected to increase slightly from 6.7% to 7.0%. The average farm-level price for 2008-09 is forecast to be $9.85 per bushel, down from the $10.10 of 2007-08.

TABLE 5-5. SUPPLY AND DEMAND BALANCE SHEET FOR SOYBEANS[a]

| | 2006-07 | 2007-08E | 2008-09F |
|---|---|---|---|
| Supply: | | | |
| Harvested Acres (millions) | 74.6 | 64.1 | 74.4 |
| Yield (bushels per acre) | 42.7 | 41.7 | 39.3 |
| | | (Million Bushels) | |
| Beginning Stocks | 449 | 574 | 205 |
| Production | 3,188 | 2,676 | 2,921 |
| Imports | 9 | 10 | 7 |
| Total Supply | 3,647 | 3,260 | 3,133 |
| Use: | | | |
| Crushings | 1,808 | 1,801 | 1,745 |
| Exports | 1,116 | 1,160 | 1,020 |
| Seed | 80 | 93 | 90 |
| Residual | 69 | -1 | 72 |
| Total Use | 3,073 | 3,054 | 2,928 |
| Ending Stocks | 574 | 205 | 205 |
| Stocks/Use Ratio | 18.7% | 6.7% | 7.0% |
| Avg. farm price, U.S., $bu. | 6.43 | 10.10 | 9.85 |
| Avg. farm price, NYS, $bu. | 6.19 | 9.75 | - |

[a]Data from USDA, World Agricultural Outlook Board, (November 10, 2008) "World Agricultural Supply and Demand Estimates." WASDE 464, P.15.

The estimated soybean price, like the price of corn, appears to be a little on the high side when compared to futures prices as of November 10. These prices range from $9.48 for January delivery to $9.77 for August delivery (Table 5-7). Typical farm prices will be below the futures quotes. New crop futures prices for beans, like those for wheat and corn, are above those for the current marketing year. From the perspective of grain producers, markets are "optimistic" about price levels in future years.

| TABLE 5-6. WORLD SUPPLY AND USE BALANCE SHEET FOR SOYBEANS[a] | | | |
|---|---|---|---|
| | 2006-07 | 2007-08E | 2008-09F |
| | (Million Metric Tons) | | |
| Supply: | | | |
| Beginning Stocks | 53.08 | 62.68 | 53.04 |
| Production | 237.33 | 220.89 | 235.74 |
| Imports | 69.05 | 78.86 | 77.11 |
| Use: | | | |
| Crush, Domestic | 195.90 | 201.96 | 203.60 |
| Total, Domestic | 225.28 | 229.96 | 233.96 |
| Exports | 71.50 | 79.43 | 77.87 |
| Ending Stocks | 62.68 | 53.04 | 54.06 |
| Stocks/Use Ratio | 27.8% | 23.1% | 23.1% |

[a]Data from USDA, World Agricultural Outlook Board, (November 10, 2008) "World Agricultural Supply and Demand Estimates." WASDE 464, P. 28.

TABLE 5-7. FUTURES PRICES FOR SOYBEANS AND SOYBEAN MEAL, THE CHICAGO BOARD OF TRADE, NOVEMBER 10, 2008

| Contract Month | Beans<br>$ per bu. | Meal<br>$ per ton |
|---|---|---|
| January 2009 | 9.48 | 276.90 |
| March 2009 | 9.5725 | 279.50 |
| May 2009 | 9.6725 | 282.20 |
| July 2009 | 9.75 | 285.00 |
| August 2009 | 9.77 | 286.20 |
| September 2009 | 9.76 | 285.70 |
| November 2009 | 9.74 | 284.50 (Dec) |
| November 2010 | 9.78 | 283.50 (Dec) |

The soybean meal price situation is similar to those for corn and soybeans. The average price in 2007-08 was $335.94 per ton, and the USDA projection is for a price of approximately $285 per ton in 2008-09 (range $255 to $315). The futures quotes (Table 5-7) suggest prices somewhat lower than the USDA projection, though not by a lot.

## Feeds

As suggested in previous sections, feed ingredient prices are expected to be lower in 2008-09 than in 2007-08. But, looking out to future years, ingredient prices could very well be higher than 2008-09. Of course, these prices change from day to day and often by large amounts. This is demonstrated in Figure 5-2, which shows the weekly prices for the March 2009 soybean meal contract. Over the life of this contract, prices have been over $430 and below $250 per ton; as on November 14, the price was $271 per ton. Clearly, purchasing ingredients in current volatile markets is a challenge. Below, we provide some suggestions about managing purchases, but there are no easy solutions when prices are as variable as they currently are. Managing price risk is costly.

FIGURE 5-2. PRICES OF SOYBEAN MEAL MARCH 2009 FUTURES CONTRACT, WEEKLY, OCTOBER 2007 THROUGH NOVEMBER 14, 2008


Professor Schmit, graduate student Leslie Verteramo, and I have a model that can project selected mixed feed costs, *conditional on* an assumed set of ingredient costs. One set of estimates for dairy and layer feeds is shown in Table 5-8. They suggest, for example, that 18% protein dairy feed could be about $55 per ton lower this coming spring than a year earlier. As noted in the table's footnote, this particular result assumes, among other things, that corn prices will be $4 per bushel ($133 per ton) and soybean meal $255 per ton. These prices are consistent with recent quotes for corn and soybean meal futures contracts for March delivery. Obviously, the actual ingredient prices next March may be higher or lower than the November quotes, and it is the volatility in the underlying ingredient prices that makes feed costs difficult to forecast.

TABLE 5-8. APRIL COMPLETE FEED PRICES FOR DAIRY AND LAYERS, NORTHEAST U.S., 1999-2008.[a]

| Year | Dairy (18%) | Layer |
|---|---|---|
| 1999 | 179 | 210 |
| 2000 | 181 | 212 |
| 2001 | 184 | 212 |
| 2002 | 192 | 215 |
| 2003 | 207 | 232 |
| 2004 | 221 | 260 |
| 2005 | 202 | 207 |
| 2006 | 217 | 237 |
| 2007 | 259 | 288 |
| 2008 | 312 | 332 |
| *2009F* | *256* | *288* |

[a] Historical prices from USDA *Agricultural Prices*. Authors' 2009 forecasts assume $4/bu corn, $255/ton soybean meal, $150/ton distillers dried grains with solubles, and $255/ton meat & bone meal.

The challenge is to buy feed or feed ingredients at prices that will provide an acceptable profit. Feed prices should not be looked at in isolation from output prices; it is the relative prices that are important. Thus, it is useful to think in terms of "assuring" a profit margin between feed costs and output prices. Is it possible, for example, to fix a profitable margin by simultaneously forward contracting milk sales and feed ingredient purchases? Market prices may not provide an acceptable margin at various points in time, but it is useful to look for opportunities to lock in an acceptable margin. The existence of futures markets provides flexibility in timing purchase and sale decisions. These markets do not provide perfect results, however, because of basis risk, but the counter-party risk is zero. Forward contracting is perhaps simpler and has no basis risk, but forward contracts have counter-party risk.

Another possible way to protect against ingredient price increases is to consider buying call options on futures contracts. But, since the futures contract underlying the option contract has a volatile price, the premium paid for the option will be relatively high. Selected options premiums for the March 2009 corn futures are shown in Table 5-9. On November 10, when the March corn futures settled at $4.015 per bushel (Table 5-4), the at-the-money call (strike price of $4) option's premium was 38.7 cents per bushel. In other words, a dairy farmer would have paid $12.90 per ton to protect against corn prices rising above $133 per ton. This may look like rather expensive price insurance to some producers, but the premium reflects the possibility that March corn prices were over $8 per bushel. Again, the question is, does an option position help assure a return on the dairy operation?

TABLE 5-9. OPTIONS PREMIUMS ON MARCH 2009 CORN FUTURES CONTRACTS, NOVEMBER 10, 2008

| Strike | Call | Put |
|---|---|---|
| 370 | 55.0 | 23.5 |
| 380 | 49.1 | 27.6 |
| 390 | 43.7 | 32.3 |
| 400 | 38.7 | 37.3 |
| 410 | 34.4 | 43.0 |
| 420 | 30.5 | 49.0 |
| 430 | 27.1 | 55.4 |

Source: Chicago Board of Trade of the CME Group

## Ending Comment

Last year, we wrote that prices would be high and volatile. This was true. The uncertainty about economic growth in the U.S. and around the world has reduced commodity price levels somewhat, but commodity prices are still high by historical standards. And, price volatility, if anything, has increased. Regrettably, these market conditions make managing price risk costly.