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Large Seed and Residual Use of Soybeans and Prospects for Year-Ending Stocks

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July 15, 2015

***farmdoc daily* (5):128**

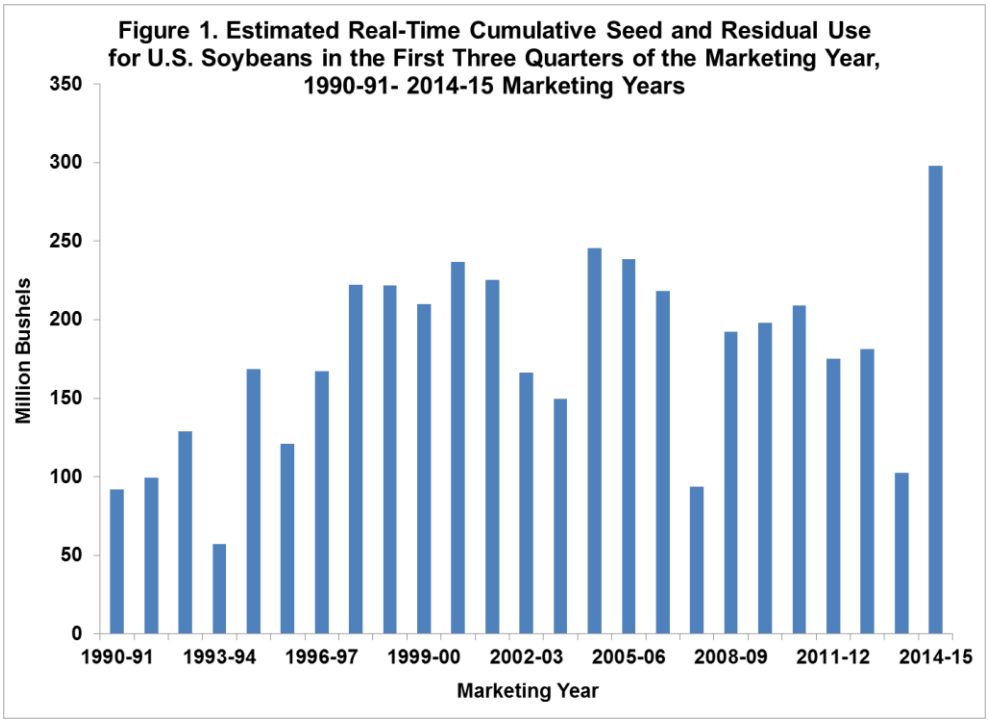
Recommended citation format: Irwin, S., and D. Good. "Large Seed and Residual Use of Soybeans and Prospects for Year-Ending Stocks." *farmdoc daily* (5):128, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, July 15, 2015.

Permalink http://farmdocdaily.illinois.edu/2015/07/large-seed-and-residual-use-soybeans-prospects.html

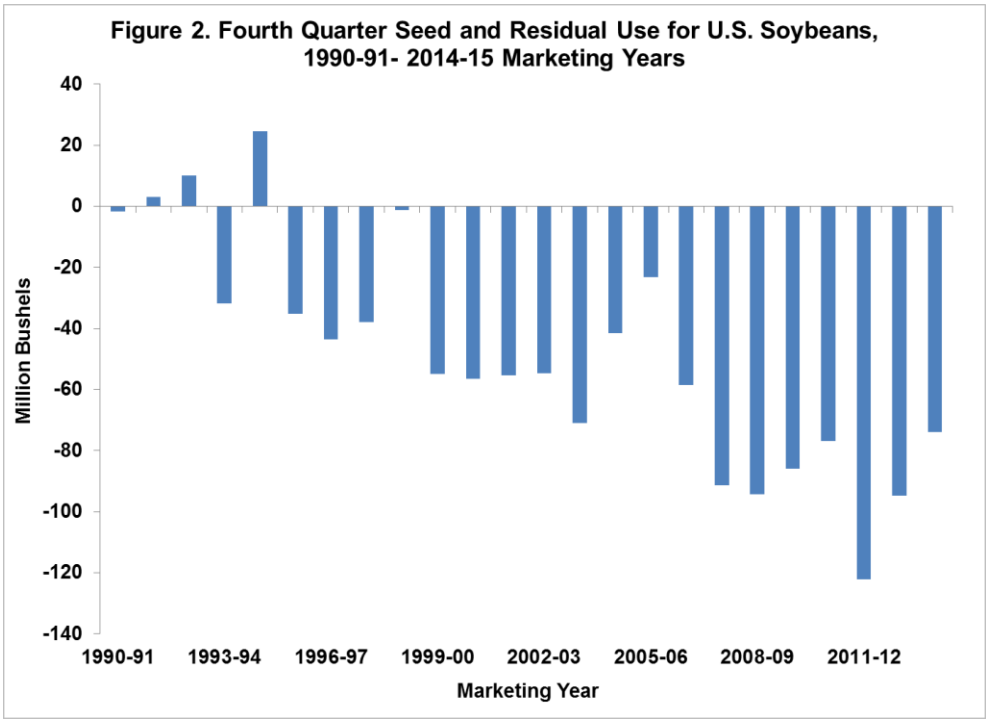
The USDA's estimate of soybean stocks at the end of the third quarter of the 2014-15 marketing year (June 1, 2015) of 625.4 million bushels was surprisingly small and helped ignite fireworks in the soybean futures market. For example, the price of the August 2015 soybean futures contract shot up over 50 cents after release of the June 1 soybean stocks estimate on June 30. That estimate comes on the heels of smaller-than-expected stocks estimates at the end of the first quarter (December 1, 2014) and the second quarter (March 1, 2015) of the marketing year. The cumulative effect of the smaller than expected stock estimates is an unusually large estimate of seed and residual (unexplained) use of soybeans during the first three quarters of the 2014-15 marketing year. Specifically, we calculate seed and residual use through the first three quarters at 297.9 million bushels based on the estimated size of the 2014 harvest, estimated stocks at the beginning of the marketing year, imports during the first three quarters of the marketing year, and estimated domestic crush and exports during the first three quarters of the year. In this article, we address the potential implications of this large unexplained use of soybeans on the magnitude of stocks at the end of the marketing year. The magnitude of those stocks has no implications for the price of old crop soybeans. However, those stocks become part of the supply of soybeans for the 2015-16 marketing year and have potential implications for the price of new crop soybeans. We analyzed the relationship between soybean endings stocks and price in a *farmdoc daily* article (May 14, 2015) earlier this year.

In Figure 1, we present an estimate of apparent seed and residual use of soybeans during the first three quarters of the marketing year for the period 1990-91 through 2013-14 along with the estimate for the current year. These estimates are based on the estimated size of the harvest in the USDA's *Crop Production Annual Summary* report released in January after harvest. In effect, these historical estimates are "real-time" calculations that are comparable to the calculations for the current year. The final estimates of seed and residual use during the first three quarters of the year differ from these estimates for some years due to changes in estimates of crop size as part of the September *Grain Stocks* report released after the end of the marketing year. In addition, since the Census Bureau discontinued reporting the size of the domestic crush in July 2011, the estimate of the size of the monthly domestic crush since then is based on National Oilseed Processor Association estimates for its members, adjusted upward to reflect the entire industry. As indicated in Figure 1, the calculation of seed and residual use of soybeans during the first three quarters of the current marketing year, 297.9 million bushels, is indeed extremely large compared to

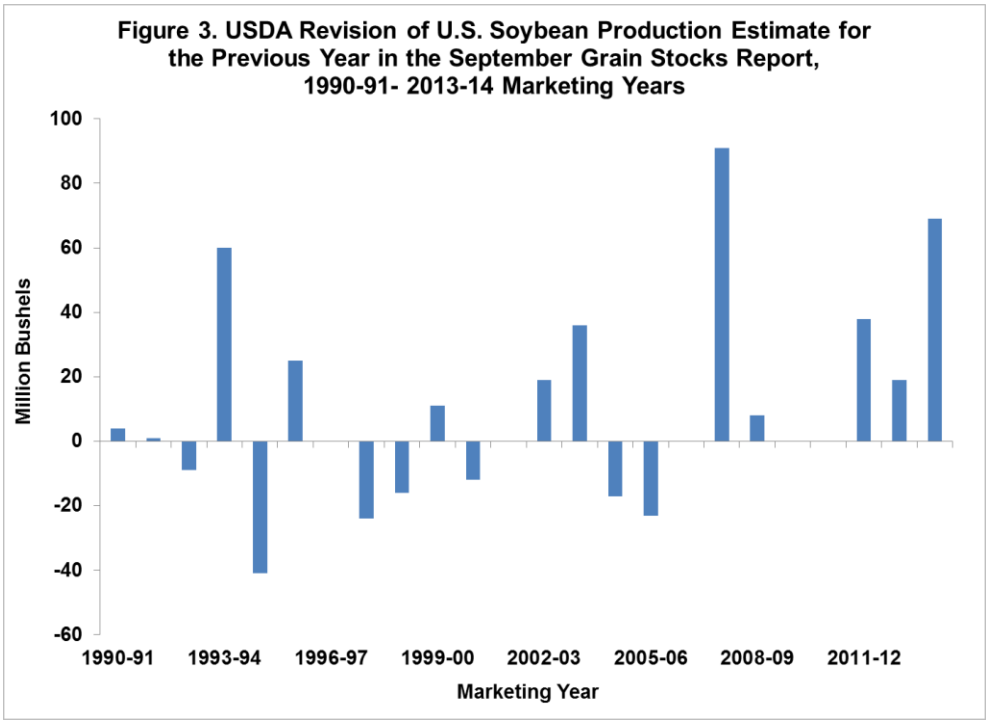
estimates at the same point in the marketing year in the previous 25 years. This estimate is about 50 million bushels larger than the previous high in 2004-05, which represents about a 20 percent increase.



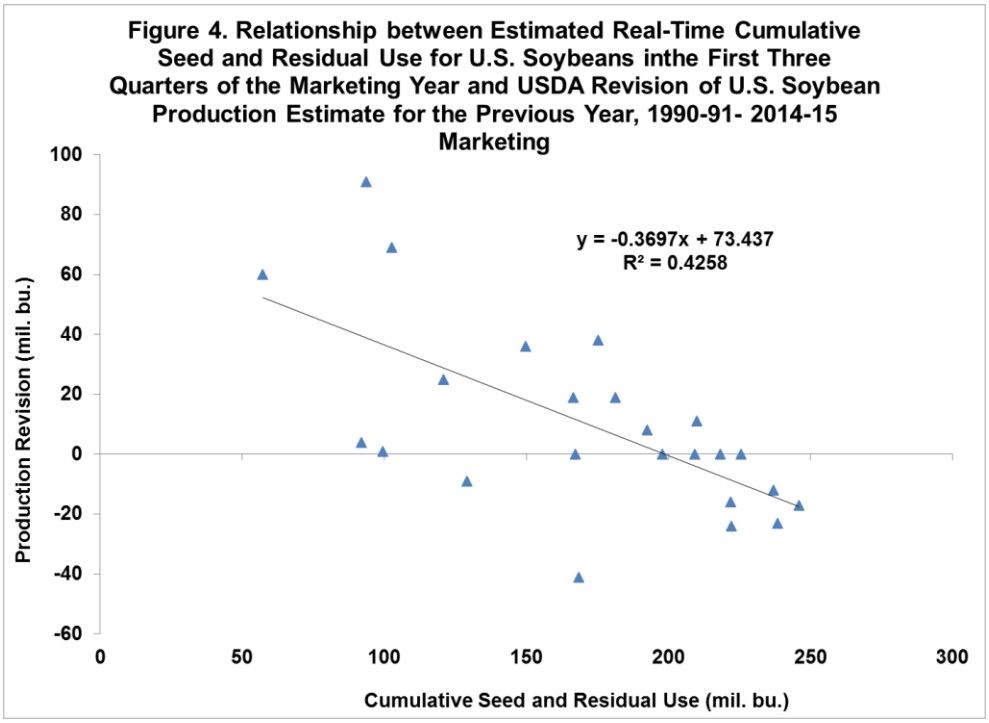
To understand the potential implications of the very large seed and residual use through the first three quarters we need to also consider the behavior of seed and residual use in the final quarter of the marketing year. As shown in Figure 2, seed and residual use during the fourth quarter of the marketing year has been negative in all but three years since 1990-91 and in all years since 1995-96. The trend has been for an increasingly large negative use during the quarter. Negative use is also expected during the fourth quarter this year. It is possible that use could be small enough to offset the large apparent use during the first three quarters and result in use for the entire marketing year being within the range of the past 25 years—85.3 to 204.6 million bushels. However, the current market expectation is that the large estimate of seed and residual use during the first three quarters of the current year will be reduced by way of a reduction in the estimated size of the 2014 crop, which will be revealed with the release of the September 1, 2015 stocks estimate.



The USDA has often revised the estimated size of the previous year's crop following the release of the September 1 stocks estimate. Examining Figure 3, we can see that some of those revisions have been large, exceeding 60 million bushels on three occasions since 1990. The question, then, is how well revisions to the previous year's crop size could have been predicted based on the calculation of seed and residual use of soybeans during the first three quarters of the marketing year?

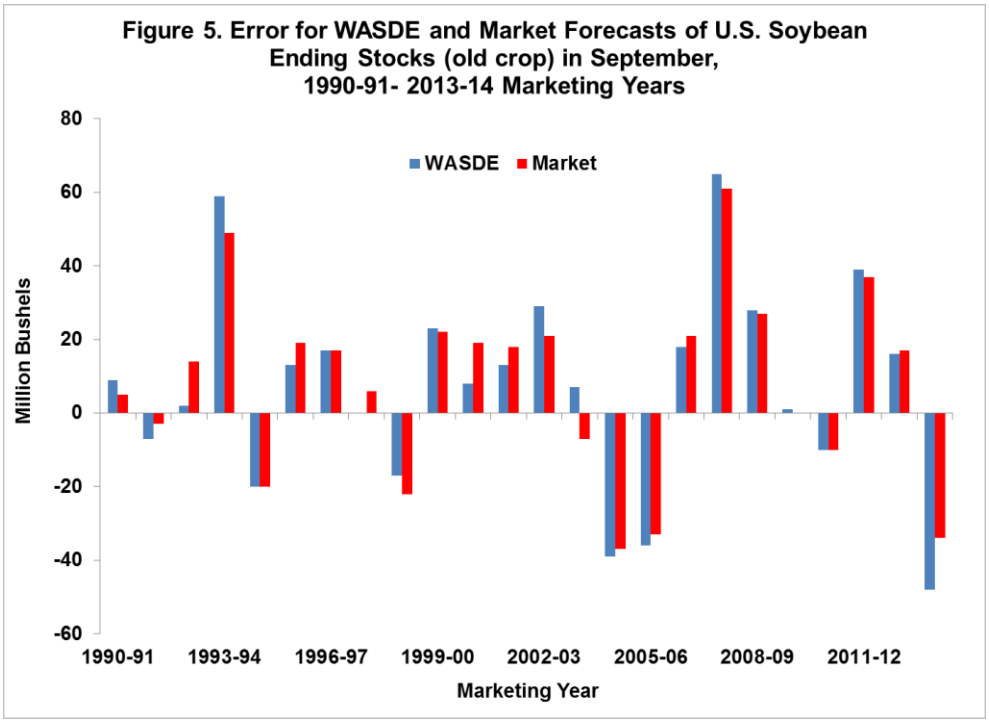


The relationship between the calculated "real-time" seed and residual use in the first three quarters and the subsequent revision in the soybean crop size estimates is shown in Figure 4. As expected, there has been a generally negative relationship between estimated seed and residual use in the first three quarters and the size of the production revision. That is, large unexplained residual use tends to be correlated with a subsequent downward revision in crop size and *vice versa*. It is interesting to note that the slope of the fitted relationship, -0.34, is substantially less than one, which implies that the USDA takes a conservative approach to revising estimates of the previous year's crop size. In other words, if seed and residual use through the first three quarters is 100 million bushels, then we should expect the USDA to revise the previous year estimate of crop size down by only 34 million bushels. This relationship does support expectations of a downward revision of the estimate of the 2014 crop size in the upcoming September *Grain Stocks* report, and perhaps a large downward revision. However, projecting the magnitude of the likely downward revision is complicated by two factors. First, the correlation between seed and residual use and changes in the production estimate is not particularly strong, as reflected in the R2 of only 0.43. Second, as pointed out earlier, the estimate of seed and residual use through the first three quarters of the current marketing year is well outside the historical range of the data used to estimate the regression.



Given this uncertainty, a key question is how well late season estimates of soybean consumption, that include forecasts of seed and residual use, actually forecast the magnitude of year-ending stocks. That question is examined in Figure 5. Shown there is the difference between the final September 1 stocks estimate and both the USDA projection of those stocks and the average market guess for the magnitude of those stocks. The USDA projection is from the September WASDE report released about three weeks before the release of the September *Grain Stocks* report. That is after the marketing year is over, but before all consumption data are fully known. The average trade guess is based on wire service surveys of crop market analysts. The size of "errors" in anticipating the September 1 soybean stocks estimates are very similar and generally in the same direction for the two sources of projections. The simple correlation between the two error series, at 0.97, is not far from perfect. This indicates a close consensus between the USDA and the market about expectations for year-ending soybean stocks based on available information. What is most important is that the errors for both the USDA and the market are routinely quite large, often

exceeding 20 million bushels and near 60 million bushels on two occasions. So, even after the marketing year for soybeans has officially ended, it is surprisingly difficult to accurately forecast the level of final ending stocks revealed in the September *Grain Stocks* report. This is not to say there is a problem with the ending stocks estimates released each year at the end of September, but instead, the estimates are inherently more variable than is widely appreciated. An in-depth discussion of the USDA grain stock estimates can be found in a series of *farmdoc daily* articles from last year (January 17, 2014; January 29, 2014; February 7, 2014; February 13, 2014; February 14, 2014) and the following research report (Irwin, Sanders, and Good, 2014).



What does all this mean for current market situation? Prior to the release of the September 1 stocks estimate, unusually large or small seed and residual use during the first three quarters of the year should result in an unusually large or small projection of seed and residual use for the year being carried in the soybean supply and demand balance sheet. Right on cue, the USDA projected 2014-15 marketing year seed and residual use at 180 million bushels in the July 10, 2015 WASDE report, which would be the largest seed and residual use since 2004-05 and well above the levels of the past eight years. The projection implies some combination of large negative feed and residual use during the fourth quarter of the marketing year and a likely downward revision in the estimated size of the 2014 crop will pull the seed and residual use down from the level through the first three quarters (297.9 million bushels). The result is an expected September 1, 2015 inventory of old crop soybeans of 255 million bushels. That projection may change slightly as the marketing year winds down and the magnitude of the domestic crush and exports becomes better known. However, it is unlikely that the projection of seed and residual use will change in either the August or September WASDE report. The bottom-line is that the projection of ending stocks, even at this late date in the 2014-15 marketing year, is still highly uncertain. Using the extremes of USDA forecast errors presented in Figure 5, the final ending stock estimate could range from 207 to 320 million bushels. Alternatively, the one-standard deviation range for the final ending stock estimate based on the history of USDA errors is 227 to 283 million bushels.

Implications

Two months from now the magnitude of both the domestic crush and exports of soybeans during the 2014-15 marketing year will be known within a very small range. In addition, most will anticipate a substantial downward revision in the estimated size of the USDA's 2014 soybean crop. The estimates of consumption and expected production revisions will be reflected in the expected magnitude of stocks of old crop soybeans on September 1 to be revealed in the *Grain Stocks* report to be released on September 30. Even armed with this information, history suggests that the actual stocks estimate could differ substantially from market expectations. A difference as large as 50 million bushels is certainly possible. Based on current projections of the domestic crush and exports, year-ending stocks for the 2014-15 marketing year, then, could be in a range of 200 to 300 million bushels. With so much uncertainty about the size of the 2015 soybean crop, an old crop stocks estimate at either extreme of this range would have important price implications for the new crop.

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