

NOVEMBER 7, 2003**FEFO 03-20****UNDERSTANDING USDA CORN AND SOYBEAN PRODUCTION ESTIMATES**

Recent comments from producers and others suggest that there is an ongoing misunderstanding of US Department of Agriculture (USDA) motives, methods and procedures used to arrive at production forecasts for corn and soybean crops. This was vividly illustrated by comments from producers, commodity analysts and farm market advisory services following the release of the August 2003 forecasts. Some in the agricultural community apparently even believe that the USDA manipulates crop forecasts to fulfill some mystical objectives that are contrary to the best interest of farmers. The purpose of this article is to improve understanding of USDA crop forecasting methods, performance and market impact.

To begin, the USDA uses a highly sophisticated and well-documented procedure to generate its crop production forecasts. For corn and soybeans, US production forecasts are released in August, September, October, and November, with final estimates published in January. The USDA generates production forecasts based on estimates of planted and harvested acreage and two types of yield indications, a farmer-reported survey and objective measurements. A review of USDA's forecasting procedures and methodology confirms the objectivity and consistency of the forecasting process over time. No changes in methodology occurred in 2003.

In terms of forecast performance, month-to-month changes in USDA corn and soybean production forecasts from 1970 through 2002 indicate little difference in magnitude and direction of monthly changes over time. The size of the monthly changes tends to diminish across the forecasting cycle (August through November). There is a positive relationship in the size and direction of forecast changes across months in both corn and soybeans, with the largest correlations found in corn. Monthly changes in USDA forecasts have been anticipated reasonably well by the private sector. As measured against the production estimate in January after harvest, USDA production forecast errors are largest in August and smaller in subsequent forecasts. There appears to be no trend in the size or direction of forecast errors over the study period.

On average, USDA corn production forecasts are more accurate than private sector forecasts over 1970-2002 (Table 1). One exception is the August forecast in the most recent time period (1985-2002). In contrast, private sector soybean production forecasts are more accurate than USDA forecasts in August and September, with the exception of the September forecast in the earlier time period (1970-1984).

USDA corn production forecasts have the largest impact on corn futures prices in August and recent price reactions have been somewhat larger than historical reactions. For soybeans, the largest reaction in futures prices occur in August and September, but recent reactions have been large in October. As predicted by economic theory, there is a negative relationship between the direction of forecast surprises



Table 1. Average Absolute Errors for USDA and Private Market Forecasts of Corn and Soybean Production, 1970-2002

	Corn		Soybeans	
	USDA Forecast	Private Forecast	USDA Forecast	Private Forecast
August	---%---		---%---	
1970-2002	5.3	5.4	4.7	4.2
1970-1984	5.9	7.0	4.9	4.8
1985-2002	4.7	4.0	4.6	3.8
September				
1970-2002	4.0	4.3	3.8	3.6
1970-1984	3.9	4.2	3.2	3.3
1985-2002	4.1	4.5	4.3	3.9
October				
1970-2002	2.4	3.1	2.4	2.6
1970-1984	2.4	3.1	2.7	2.7
1985-2002	2.5	3.0	2.1	2.6
November				
1970-2002	1.2	1.6	1.4	1.5
1970-1984	1.3	1.8	1.8	2.1
1985-2002	1.0	1.4	1.1	1.1

and the direction of price reactions for both corn and soybeans, with a somewhat stronger relationship for corn than for soybeans.

Despite many claims to the contrary, the August, September and October 2003 USDA corn and soybean production forecasts were within or near historical ranges in terms of magnitude of changes, market surprise and price reaction (Tables 2 and 3). The September and October soybean forecasts were major market surprises, and the market's price reactions showed this, but they were not unprecedented.

Overall, the analysis reviewed in this article suggests the USDA performs reasonably well in generating crop production forecasts for corn and soybeans. There is strong evidence that market participants view USDA corn and soybean production forecasts as important new information. There is nonetheless room for improvement. In particular, the USDA may want to consider expanding the scope of the subjective yield surveys to incorporate a wider range of market and industry participants. Further details on USDA crop forecasting methods and complete results can be found at:

http://www.farmdoc.uiuc.edu/agmas/reports/03_07/AgMAS03_07.pdf.

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Table 2. Key Indicators for 2003 Corn and Soybean Crop Production Forecasts and Historical Ranges over 1970-2002

Release Month	Corn			Soybeans		
	Change in Forecast	Market Surprise	Price Reaction	Change in Forecast	Market Surprise	Price Reaction
August		---%---			---%---	
2003	NA	-2.3	6.4	NA	-2.8	3.7
Previous High	NA	4.5	12.7	NA	3.7	11.4
Previous Low	NA	-6.3	-6.3	NA	-3.2	-6.0
September						
2003	-1.2	1.4	-0.8	-7.7	-4.3	5.3
Previous High	4.5	3.1	2.2	5.3	4.2	2.3
Previous Low	-16.2	-2.2	-3.8	-16.7	-4.0	-5.6
October						
2003	2.6	1.4	-1.4	-6.6	-3.8	4.4
Previous High	3.7	2.4	4.5	6.4	4.4	4.9
Previous Low	-5.5	-2.6	-3.8	-4.8	-3.5	-9.4

Notes: NA stands for not applicable. The previous high and low for a given month refer to the high and low over the 1970-2002 period. Change in forecast is the percentage change in a USDA production forecast relative to the previous month. Market surprise is the percentage difference between the USDA forecast and the private market forecast for a given month. Price reaction is the percentage change in futures prices (December for corn; November for soybeans) from the closing (settlement) price the day before a crop report is released to the first non-limit opening or closing price after a report is released.

Table 3. Comparison of Actual Price Reaction to the Release of 2003 USDA Corn and Soybean Production Forecasts to the Price Reaction Predicted by Historical Relationships over 1970-2002

Month	Corn		Soybeans	
	Actual Price Reaction	Predicted Price Reaction	Actual Price Reaction	Predicted Price Reaction
		---%---		---%---
August 2003	6.4	2.8	3.7	0.6
September 2003	-0.8	-1.1	5.3	1.4
October 2003	-1.4	-1.2	4.4	3.6

Note: The predicted price reaction for 2003 is computed using a regression model of the relationship between market surprise and actual price reaction over 1970-2002.

