USDA Crop Forecasts: *A Good Track Record*

by James P. Houck
and Carroll Rock

➢ **USDA's record in forecasting crop production is a good one. Several factors account for this performance. Two are especially important. Data gathering is sophisticated and while the news gets out on a timely basis, there are no leaks.**

Farmers, business leaders, and governments around the world regularly use USDA's crop forecasts and estimates to make decisions worth billions of dollars. These crop forecasts are often criticized. The critics say they are too high or too low, too slow to adjust or too fast, and sometimes they are even accused of being sensitive to political winds. Therefore, it is appropriate to look at the record which we do in this article. Specifically, we examine USDA's corn and soybean production forecasts within recent crop years. Some of these years have been quite extraordinary. Our conclusion is that the record is a very good one.

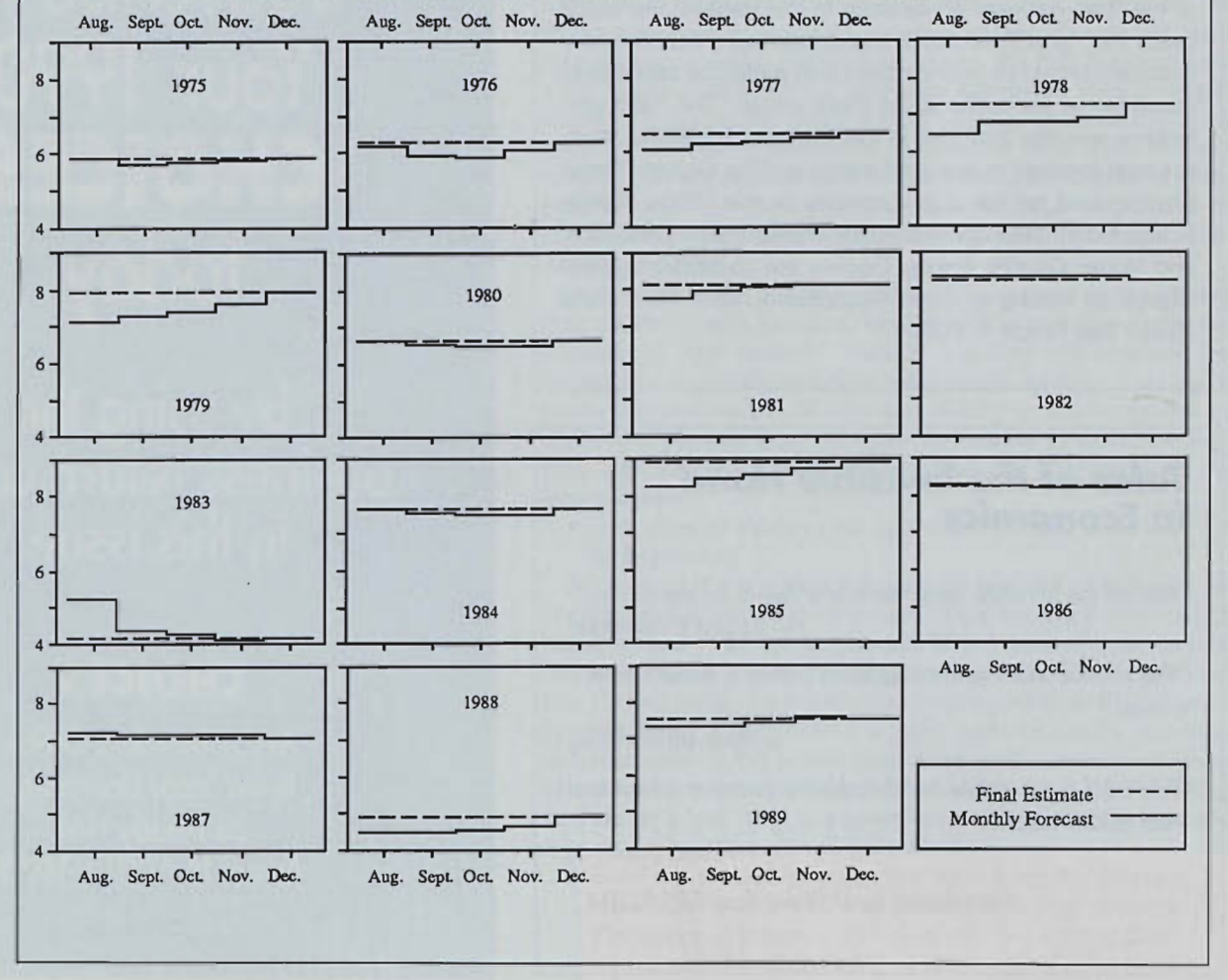
The Track Record

Beginning in August for corn and soybeans, the USDA's National Agricultural Statistics Service (NASS) issues monthly production forecasts. Since acreage data are fairly firm by then, month to month changes in indicated production are mostly due to changes in yield forecasts—changes that reflect the uncertainties of weather and pests. These uncertainties cannot be predicted or measured in advance. The difference between any individual month's forecast and the final, year-end estimate, therefore, is not an "error" in the sense that better measurement alone could eliminate it. Though the difference doubtless involves some error in measurement, primarily it is due to the extent to which after forecast environmental conditions depart from average. (Table, p. 32).

Figures 1 and 2 show how NASS corn and soybean production forecasts behaved month to month during the 15 growing seasons from 1975 through 1989 and how these forecasts compared to final production estimates. There is no common pattern, but if you compare panels in figures 1 and 2, you will see a general similarity in the way that both corn and soybean monthly forecasts approach final estimates from year to year. This is because the major production areas of both crops overlap substantially.

Sometimes early forecasts are high and then approach the final estimate from above, as in 1983 for corn and 1984 for soybeans.

Figure 1: Corn: Indicated Production by Months; Billion Bushels



Often the approach is from below, as in drought-stricken 1988 for both crops. In other years, the pattern is either nearly flat (1987, corn) or back-and-forth around the final estimate (1985, soybeans).

The data in the table show how the average difference between the forecast and the final estimate decreases as the growing season progresses toward harvest. Soybean forecasts appear slightly more subject to variability than corn forecasts. Still, the average variability seems rather small considering the many uncertainties faced by the forecasters. Also notice that only in August of 1983 did the maximum difference between the forecast and the final estimate for either crop exceed 10 percent.

Although not shown here, similar calculations for the period 1963 through 1975 show that monthly production forecasts for corn and soybeans were only slightly less variable around the final production estimates than they are now (1975-1989). This is the case even though corn production itself is now about 70 percent more unstable from year to year than it was during that earlier period and soybean production, about 50 percent more unstable. So the year-to-year environment in which today's forecasts are being made is substantially more unstable than it was only 15 or 20 years ago. All in all, the record of NASS in forecasting corn and soybean production is a fairly good one.

Good Forecasts Require Good Data

The forecast record is as good as it is largely because of the sophisticated data gathering system that is in place (Box 2). Information begins to flow early in each crop year; the first acreage report for spring-seeded crops like corn and soybeans is the March Prospective Plantings Report. These planting estimates are based on a quarterly survey which provides statistically sound state, regional, and national estimates. During the first two weeks of March, approximately 75,000 farmers nationwide are asked about their spring planting plans by mail, telephone, and personal interview. About 90 percent of those queried actually respond. Acreage estimates are then computed from these data.

On June 1, another quarterly survey begins. Again, about 75,000 farmers are asked about spring planting acreage and acreage available for harvest. At the same time, a separate nationwide area sampling of some 60,000 farm operators also is conducted. This sample focuses on about 16,000 specific land area segments. Part-time interviewers use aerial photographs to account precisely for land use within each of these selected land segments.

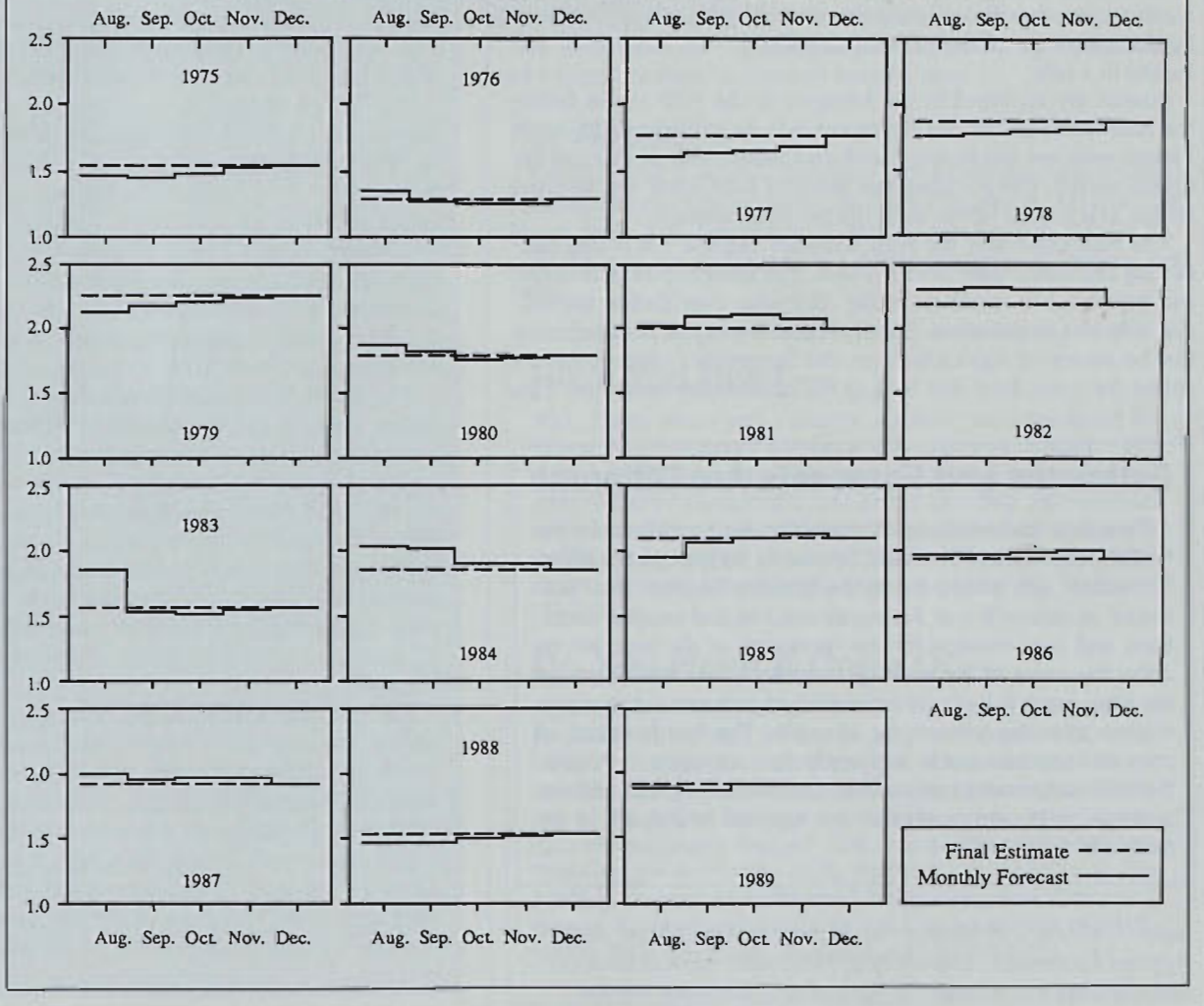
Results are released in the July acreage report. The estimates of planted acreage, published in the July report, usually change very little in the ensuing months. Possible revisions stem from additional information gathered in quarterly surveys completed during September and December.

With the introduction of quarterly agricultural surveys in 1985, most NASS crop surveys are now based on a probability sample. This approach offers three distinct advantages. First, the survey results have a known degree of statistical precision. Second, a representative cross section of national production is ensured. Third, survey results do not depend on interaction with any other data; they are independent.

Some non-probability samples continue to be used during the growing season. For instance, a panel of farmers is asked regularly about expected crop yields. Also, a large non-probability survey is conducted at the end of the growing season to enable each state office to estimate its local county acreage, yields, and production.

No matter how selected, individual farmers are the core of the

Figure 2: Soybeans: Indicated Production by Months; Billion Bushels



information base for these crop forecasts and estimates. So the overall reliability of this work depends crucially upon how fully and carefully farmers respond to surveys and interviewers. All indications suggest that, when asked, most U.S. farmers respond accurately and promptly to these inquiries.

Corn and Soybeans: Differences Between Monthly Production Forecasts and Final Estimates, 1975-1989

Month	Corn		Soybeans	
	Average difference	Maximum difference	Average difference	Maximum difference
		(Percent)		*(Percent)*
August	5.7	+24.5 (1983)	6.1	+9.6 (1983)
September	3.9	-9.4 (1988)	4.1	+9.0 (1984)
October	3.2	-7.5 (1988)	3.4	+6.0 (1984)

The News Gets Out And There Are No Leaks

The contents, date, and hour of release for each NASS report in the coming year is announced in December. Work on each report begins long before its release date even though the final information must not leak out before then. Forecasts for corn and soybeans are among the most sensitive because these crops are heavily traded on both cash and futures markets. Anyone having early access to official totals would have a formidable trading advantage. Consequently, strict precautions are taken to prevent such leaks.

State statisticians prepare initial monthly forecasts for their states and transmit them (with supporting materials) in electronically coded form to Washington, DC, for review by the Agricultural Statistics Board (ASB). All electronic transmissions of corn and soybean data whether by diskette, tape, or otherwise are placed in a secure pouch without being decoded. This pouch is logged in by the Secretary of the ASB or an official from that office and locked in a safe.

Guards are stationed at the entrance to the ASB rooms before the ASB meets on the day the report is to be published. Doors are locked, window blinds are closed and sealed, and telephones are disconnected. Only authorized persons may enter the secured rooms, and no one leaves until the report is released.

The ASB chair and the ASB secretary remove the pouch containing the coded data from the safe. The information is decoded and presented to members of the ASB who then decide the official forecasts or estimates. Shortly before the report is distributed, the Secretary of Agriculture or the Secretary's representative enters the room for a first look at the commodity estimates. This official is briefed on the report (which has been printed inside the locked area) and then signs it.

Minutes before release, the board chairperson takes sufficient copies of the report to the news room outside the locked area. Reporters from wire services, newspapers, radio, television, and brokerage houses wait behind a restraining line with open telephone connections. At the release time—which is always after all U.S. commodity futures markets are closed—the report is delivered to everyone in the room.

State and national estimates also go immediately by telephone, computer, or FAX to state offices where they are then announced to local news reporters. The eagerness with which these reports are seized by reporters and relayed to the public shows how important and reliable they are judged to be.

Estimates and Forecasts Are Different

Forecasts and estimates of production are considered by the National Agricultural Statistical Service to be two distinct items. "Forecasts" are issued during the growing season, and "estimates" at season's end. Forecasts assume that weather conditions and pest damage for the remainder of the year will be about the same as the average of recent years. Estimates, on the other hand, refer to an accomplished outcome —actual production after the harvest, for example. The first forecasts of corn and soybean yields and production are made in August, then revised monthly until harvest. The end-of-year estimates of acreage, yield, and production are reported in January of the new year.

James P. Houck is Professor, Department of Agricultural and Applied Economics, University of Minnesota. Carroll Rock is State Statistician, Minnesota Agricultural Statistics Service.

The National System

The National Agricultural Statistics Service (NASS) of the U.S. Department of Agriculture prepares and publishes official crop estimates but is not a policy making organization. Headquartered in Washington, DC, it consists of the Research and Applications Division, the Systems and Information Division, the Estimates Division, and the State Statistical Division which includes 45 State Statistical offices (SSO's). (The New Hampshire office serves six New England states.)

The SSO's conduct surveys, analyze data, and send state and county estimates to the Agricultural Statistics Board (ASB) in Washington. This board is not a fixed organizational unit within NASS. It is convened to review, evaluate, and officially adopt estimates for publication. The ASB has several permanent members plus five or six commodity specialists selected from the Estimates Division and the SSO's. State representation changes for each report to provide input from all parts of the country and to assure that statisticians with firsthand, local knowledge contribute to the final estimates.

The SSO's also publish information of interest to their own states. For example, the Minnesota Agricultural Statistics Service publishes weekly crop-weather reports during the growing season, a bi-weekly agricultural news release, and an annual report called *Minnesota Agricultural Statistics*. Other SSO's across the nation issue comparable reports.

This decentralization of data collection and analysis reflects the long-held view that SSO statisticians (1) have better knowledge of regional conditions than those in Washington, DC, and (2) can more easily adapt general procedures to local circumstances.

For corn and soybeans, the annual reporting cycle begins early in the year with farmers' intentions to plant. This is followed by a planted acreage report and monthly forecasts of acreage intended for harvest, probable yields, and potential production. Beginning on August 1 and continuing on the first day of each month through November 1, crop production forecasts are gathered. They are compiled and released about 10 days later. Then in January of the new year, final estimates of acreage harvested, actual yields, and production are made.