RESEARCH·MACRO NOTE·OCTOBER 30, 2026·7 MIN READ

How far can USDA's August corn yield miss the January final?

Every August, USDA prints its first survey-based US corn yield. A band built from its past August misses covered 21 of 22 seasons against a nominal 80%: too wide, and about 4 points of the excess are expected from the estimator itself. For me, this case study is less about being groundbreaking and more about gaining experience with commodities data.

ECONOMICS

ACCOMPANYING PAPER The full academic working paper is published separately as a PDF at nikkhosravipour.com. This document is the essay itself, for reading.

USDA, the US Department of Agriculture, publishes official estimates of how much corn the US grows. Numbers like these give the basis for prices and speculation how future conditions might be like. In the case of corn, it goes mostly into products like animal feed and ethanol as well as exports, so crop size matters well beyond farms. Looking at how these numbers are put together, Crop Production reports yield, the bushels per harvested acre, and production, which is yield times harvested acres. The monthly WASDE then puts this into a balance sheet: supply minus use leaves ending stocks, also called carryout, the corn left when the season ends. Prices trade that leftover; the agricultural market the way it works today is extremely dependent on speculators. So traders and speculators move on every revision, which is where an August yield number starts to matter.

What happened in 2020, and why should a trader care? In August 2020 the USDA's estimates were much higher than the actual numbers collected in January. Yield went from 181.8 bushels per acre to 172.0. To put that change in context, the yield band is a range around the forecast. Now the interesting part in this story is that while the January yield still fell inside of our 80% yield band, it had a real impact that any trader should be interested in. Namely that the final was near its edge, outside the 50% yield band. That meant that production fell by 1,095.7 million bushels, of which yield accounted for 823.4 million bushels and area for 272.3, so January production fell outside even the 80% production band. Although the real number that should interest us is less the actual yield, but rather how much is left over at the end of the season. That's the actual number that matters on the exchange. USDA's projected ending stocks went from 2,756 million bushels in August to 1,552 in January, which removed 1,204 million bushels. And we saw in 2020 that while the estimate was just 5% off, the leftover was 44% less.

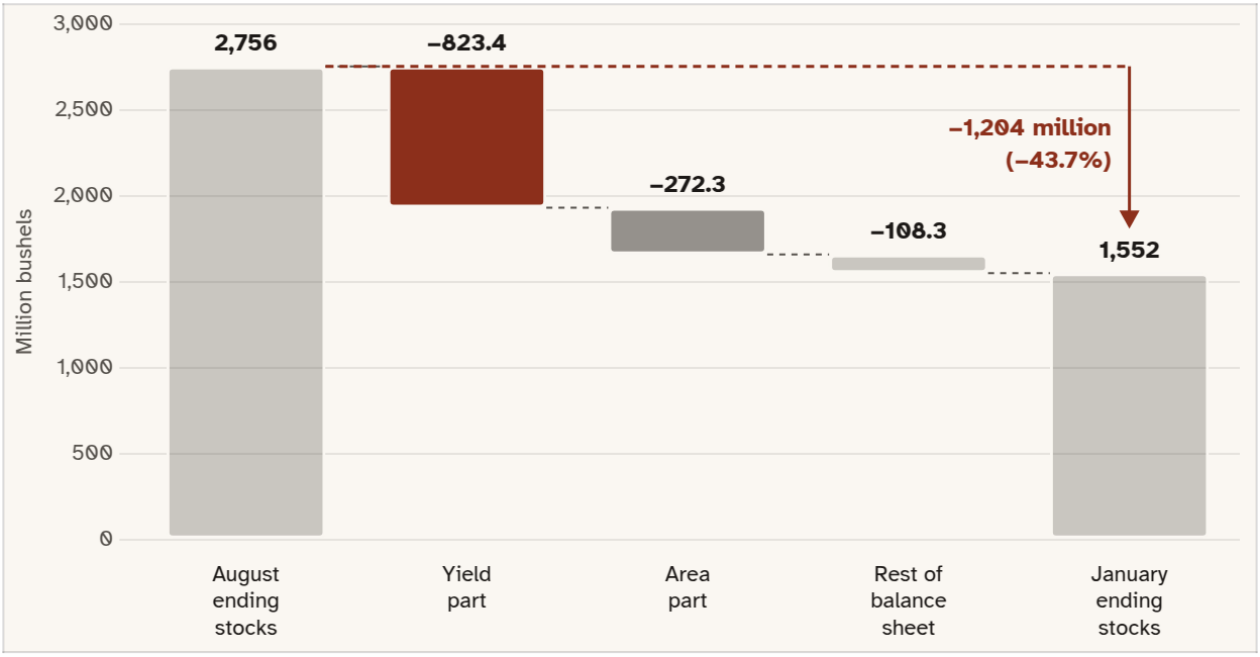


FIG. 1 · WATERFALL, MILLION BUSHELS. USDA AUGUST 2020 ENDING STOCKS 2,756, YIELD PART −823.4, AREA PART −272.3, REST OF THE BALANCE SHEET −108.3, JANUARY 2021 ENDING STOCKS 1,552. NET CHANGE −1,204 MILLION BUSHELS, −43.7 PERCENT.

To understand why this is significant we need to look at how much the August numbers are usually off: Each August the USDA releases its estimate of how much corn will be harvested. The real numbers are usually fully realized and public by the following January. That is why the purpose of this project is to calculate how accurate USDA's yearly estimates are to see how much one can rely on these numbers. USDA's past August-to-January percent errors since 1995 set an 80% band, which is meant to catch the January final about four years in five. That band caught 21 out of the last 22 seasons (95.5%), a lot more than the 80% it aims for, so the pre-registered verdict was too wide. One reason being that we use too few data points to learn from, which by itself accounts for about 4 percentage points of the excess. The rest could also just be luck. The risk of these results is the use of too wide of a band, which makes the outcome look more uncertain than it really is.

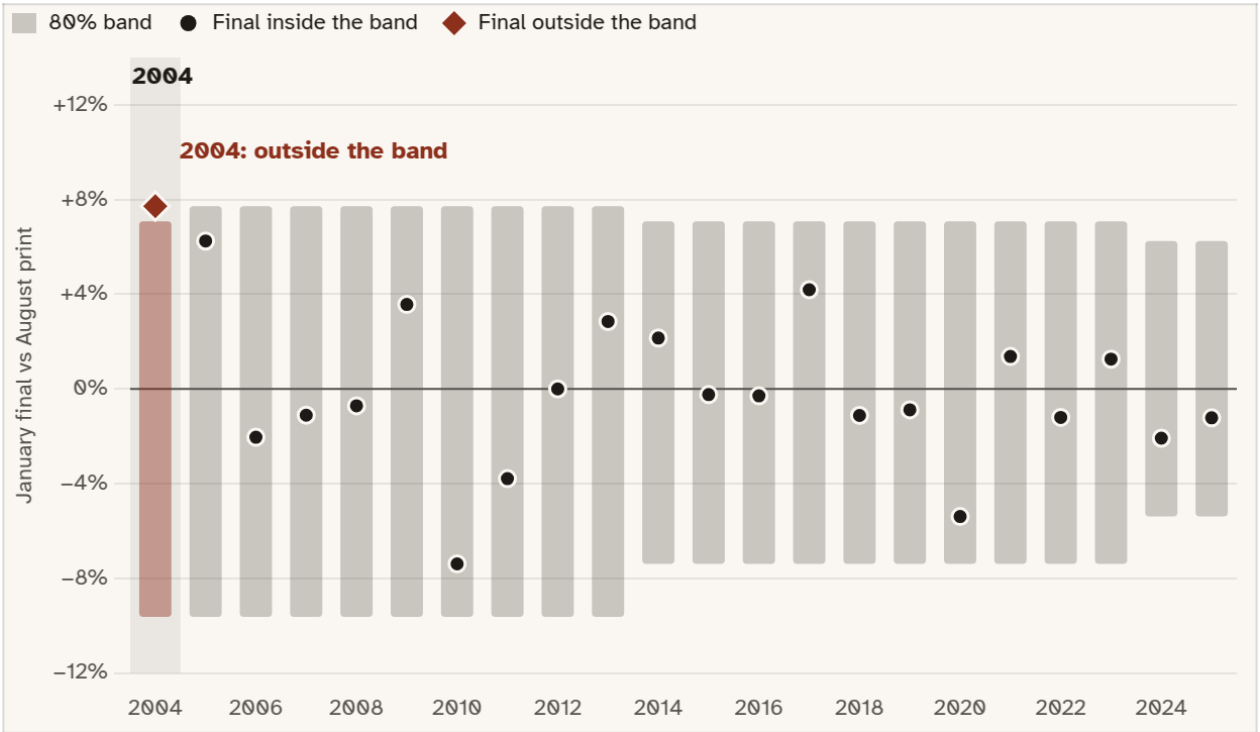


FIG. 2 · SEASON BY SEASON, 2004 TO 2025: THE 80 PERCENT BAND AROUND USDA'S AUGUST CORN YIELD PRINT AND WHERE THE JANUARY FINAL LANDED. THE FINAL WAS INSIDE THE BAND IN 21 OF 22 SEASONS; THE ONE SEASON OUTSIDE WAS 2004. THE 50 PERCENT BAND HELD 13 OF 22.

If the August yield got more accurate, did the risk to the balance sheet go away? The biggest errors made by the USDA in the past are old, and since then most of their estimates have come rather close. But at the same time their estimates for how many acres of corn are harvested have moved in the opposite direction. That matters because we calculate production by multiplying yield and acres, so if one gets more accurate and the other less, the overall revisions stay about the same, on average 348 million bushels for 1995 to 2009 and 351 million for 2010 to 2025, on a much bigger crop. This split is exploratory and was only described after the fact. For example, you can see this in 2025. Namely that while the yield decreases, the overall crop actually increased. This is due to the sum of acres that were harvested was much higher than the USDA expected. Ending stocks were also revised by +110 million bushels (5.2%).

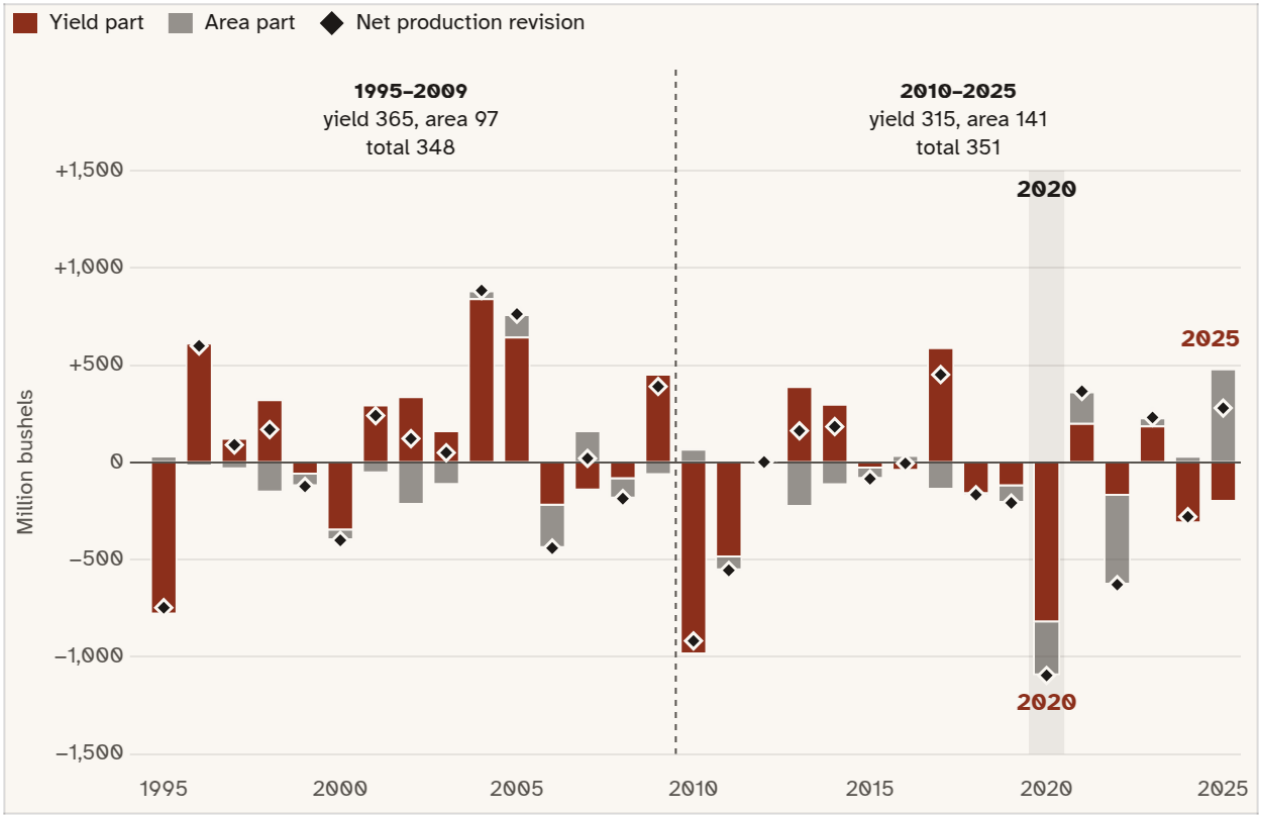


FIG. 3 · STACKED BARS BY SEASON, 1995 TO 2025: THE REVISION FROM USDA'S AUGUST PRODUCTION TO THE JANUARY FINAL IN MILLION BUSHELS, SPLIT INTO A YIELD PART AND AN AREA PART, WITH THE NET REVISION MARKED AND A DIVIDER BETWEEN 1995-2009 AND 2010-2025. 2020 AND 2025 ARE LABELLED. EXPLORATORY, DESCRIBED AFTER THE FACT. MEAN ABSOLUTE YIELD PART 365 THEN 315, AREA PART 97 THEN 141, PRODUCTION 348 THEN 351.

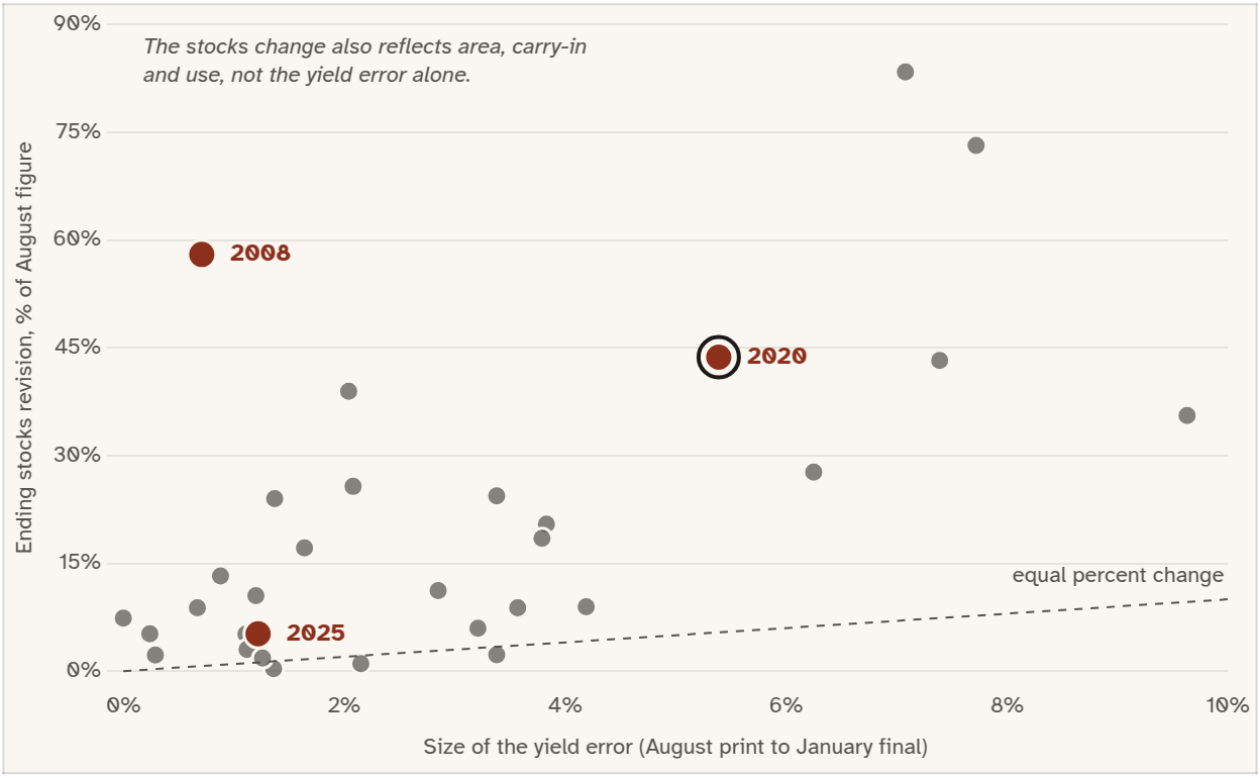


FIG. 4 · SCATTER, ONE POINT PER SEASON 1995 TO 2025: SIZE OF THE YIELD ERROR ON THE HORIZONTAL AXIS, SIZE OF THE ENDING STOCKS REVISION AS A PERCENT OF THE AUGUST FIGURE ON THE VERTICAL AXIS, WITH A DASHED LINE WHERE BOTH ARE EQUAL. THE STOCKS REVISION WAS LARGER IN PERCENT THAN THE YIELD ERROR IN 28 OF 31 SEASONS. 2020: 5.4 PERCENT ERROR, STOCKS −43.7 PERCENT. 2025: 1.2 PERCENT ERROR, STOCKS +5.2 PERCENT. 2008: 0.7 PERCENT ERROR, STOCKS +58.0 PERCENT. EXPLORATORY. THE STOCKS CHANGE ALSO REFLECTS AREA, CARRY-IN AND USE.

To see what this means, for 2025 we put both production bounds into USDA's August 2025 balance sheet for 2025/26, holding use fixed, so this part is not scored. The result is stocks-to-use, which is ending stocks as a percentage of total use. Using this methodology we get a range around 6 to 20% which still covers USDA's 13.3%. On the lower end we would see a tighter market that could mean higher prices, while the upper end could mean more of a cushion, with USDA being at the middle of it. For this year, in October 2026, USDA's 181.2 bushels per acre sits within an 80% band of 176.4 to 185.7, built around it. But we cannot judge an 80% band from one January. About one season in five should fall outside, so we look at 21 of 22 for the August band (pre-registered test) and 17 of 20 for this October band (exploratory). So checking this 2026 band against the January 2027 numbers would mean checking our math.

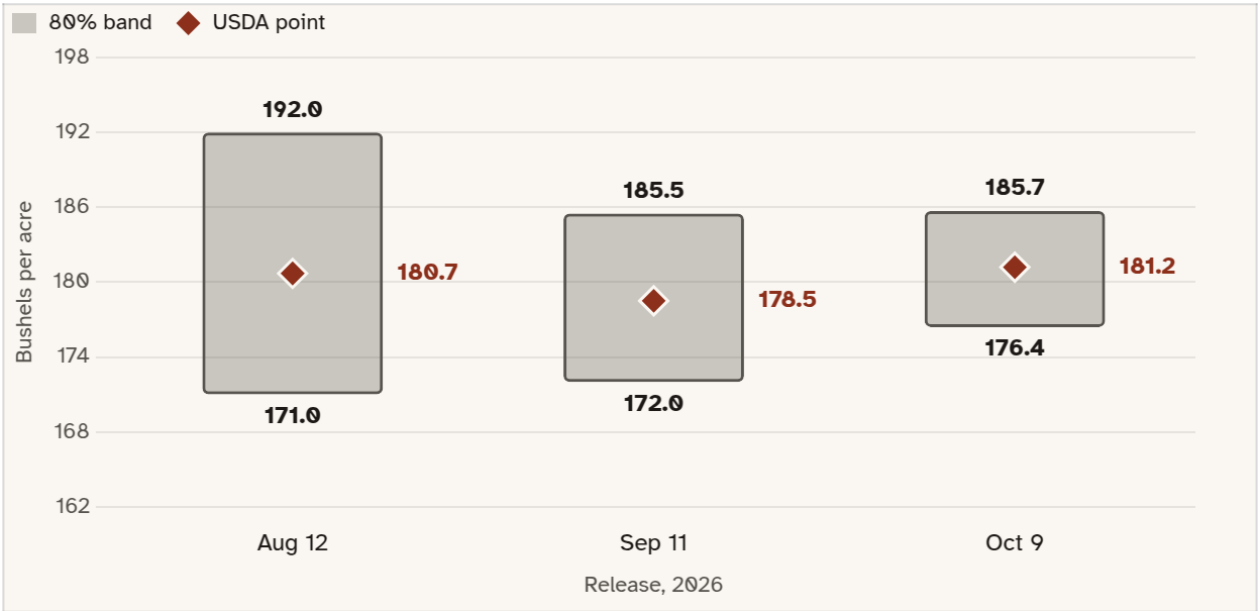


FIG. 5 · 2026 CORN YIELD, BUSHELS PER ACRE: USDA'S POINT AND THE 80 PERCENT BAND AT THE AUGUST, SEPTEMBER AND OCTOBER 2026 RELEASES. AUG 12: POINT 180.7, BAND 171.0 TO 192.0; SEP 11: POINT 178.5, BAND 172.0 TO 185.5; OCT 9: POINT 181.2, BAND 176.4 TO 185.7. FORECAST ONLY, UNSCORED.

The USDA reports WASDE, Crop Production and Crop Progress carry release timestamps, and a guard, a check in the code, blocks values released after the forecast date. Those rules were set before the test and can be replicated with the public data pipeline and code. But we had replicated the Good–Irwin August versus final table first, so we roughly knew how forecasts behaved.

Background. Others have studied USDA's forecasts in far more depth. Isengildina-Massa, Irwin and Good (2009) built intervals from past errors for WASDE price forecasts. Irwin, Good and Sanders (2014) tracked USDA's corn yield errors over time. Isengildina-Massa, Karali and Irwin (2020) compared USDA with the average private forecast through 2019: USDA appeared to regain an edge on August corn production from the mid-2000s, though the 2002-2019 gap was not statistically significant. Specialist analysts and large grain merchants such as ADM, Bunge, Cargill and Louis Dreyfus follow these numbers closely. The main limit is that I score USDA against January, not against the pre-report average that desks trade.

Code and data · Desk memo (PDF)

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