



Guidance on Price Forecast Models for the FarmDOC ARC/PLC Calculator

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Some farmers and other agricultural professionals will use the FarmDOC ARC/PLC Calculator (<https://fd-tools.ncsa.illinois.edu/>) to project their ARC and PLC payments for the 2021 crop year to help guide their decisions. The Calculator offers several options for the average crop price. This post provides guidance on which options to use to project your 2021 ARC and PLC payments.

Once you have selected your state, county and crop (and sometimes irrigated versus non-irrigated), you can choose the price Forecast Model. For the current signup, you are choosing the average expected crop price for the 2021 marketing year. The tool simulates random prices around this average, as actual marketing year prices for crops in the 2021 are unknown. Prices for other years do not affect projected payments for 2021.

Each Forecast Model has a name and the table below lists the average prices for 2021 for each Forecast Model (or click the information button next to the Forecast Model). Model names are sorted from the lowest to the highest price for each crop. For corn and wheat, two models have the same average price.

Average 2021 expected crop prices for FarmDOC ARC/PLC Calculator Forecast Models

Model	Corn	Model	Soybeans	Model	Wheat
Low	\$3.20	Low	\$8.10	Low	\$4.60
Mid	\$3.40	COVID	\$8.30	Mid	\$4.70
COVID	\$3.40	Mid	\$8.50	COVID	\$5.00
Pre-COVID	\$3.60	Pre-COVID	\$8.70	Pre-COVID	\$5.00
CBO	\$3.73	High	\$8.90	CBO	\$5.09
High	\$3.90	CBO	\$9.12	High	\$5.25

What Price Forecast Model Do I Use?

The USDA publishes long-range forecasts of farm prices in February and November each year. In November 2020, USDA Office of the Chief Economist projections were \$3.65 for corn, \$10.00 for soybeans and \$4.90 for wheat (<https://www.usda.gov/oce/commodity-markets/baseline>). We expect USDA Economic Research Service projections to be published in February 2021 (available here: <https://www.ers.usda.gov/publications/pub-details/?pubid=95911>).

Unfortunately, none of the Forecast Models match these price projections, so which model should farmers use? The basic question is: How does a farmer use the Calculator to project payments for a different price forecast than those provided?

A simple method is to pick the price forecast models closest to the projected price you want and do a basic projection of your own. For example, the average of the \$3.60 and \$3.73 is \$3.69,

close to the \$3.65 projected corn price. So, run the ARC/PLC Calculator using the Pre-COVID and CBO forecast models and take the average of the projected ARC and PLC payments as an estimate of what payments would be for a \$3.65 price projections. You can round a little closer to the payments with \$3.60 to account for \$3.65 not being the average price. Similarly, for wheat, the projected price is \$4.90, so run the Calculator with the Mid and COVID models and take the average of the payments, rounding closer to the payments for the COVID model. For soybean, this will not work, because the current \$10.00 projection is not between any prices in the table above. Thus, run the High and CBO models and know that the payments will decline further as the expected price increases.

Formal Interpolation and Extrapolation

If you are interested in a more formal payment projection, you can linearly interpolate payments for a price between prices on the table or extrapolate for prices beyond the range of the table. Suppose you want to project payments for a Projected Price not available for any forecast model. Find the forecast models with the two prices as near to that price as you can – either one above and one below or the two just below or just above it. Call these prices Price A and Price B. Run the Calculator using the forecast model with Price A, and find the associated Payment A, then run the Calculator using the forecast model with Price B, and find the associated Payment B. You can then calculate the Projected Payment for the Projected Price using the formula below:

$$\text{Projected Payment} = \text{Payment B} + \frac{(\text{Payment B} - \text{Payment A})}{(\text{Price B} - \text{Price A})} \times (\text{Projected Price} - \text{Price B}).$$

For example, suppose you have a Price A = \$8.90 and Price B = \$9.12 for soybeans, with Payment A = \$13.26 and Payment B = \$11.34. The Projected Payment for a Projected Price of \$10.00 is:

$$\text{Projected Payment} = 11.34 + \frac{(11.34 - 13.26)}{(9.12 - 8.90)} \times (10.00 - 9.12) = 3.66, \text{ or } \$3.66 \text{ per base acre.}$$

It does not matter which price is A and B, as long as they are matched correctly with payments A and B. Also, it does not matter if the projected price is between A and B or outside their range, though the projection works best using the two prices nearest the projected price. Also, the projection is a linear projection and so is not exact and the prediction error for the projected payment will grow the farther the projected price is from prices A and B.