

Estimating Yield Potential of Corn



Every year around the milk or “roasting ear” stage, we begin to wonder how good the corn crop is going to be. This especially holds true in years that corn yields are looking really good.

There are several yield prediction methods. The most popular is the yield component method, which can be used well ahead of harvest. This method can be used beginning at the roasting ear or milk (R3) stage of kernel development. Under normal conditions, the kernel milk stage occurs about 18 to 22 days after pollination. Estimates made earlier than the R3 stage could overestimate yield if stress occurs causing kernel abortion.

The yield component method was first described by the University of Illinois. It is based on or includes ears per acre, number of kernel rows per ear, number of kernels per row, and weight per kernel. The first three yield components (ear number, kernel rows, kernels per row) are easily measured in the field.

However, final weight per kernel cannot be measured until the grain has reached harvest moisture. Therefore, an average value for kernel weight is used in the yield estimation equation. Kernel weight will vary depending on growing conditions for a particular field or year. The original equation used 90,000 kernels to equal a bushel of corn or 56 pounds. However, kernel size has increased as hybrids have improved over the years. Currently, 75,000 kernels per bushel is used if growing conditions were excellent during the season.

Also, issues with non-uniform plant populations and low spots across the field could impact the accuracy of your yield estimation. For more accurate estimations in non-uniform fields, take more samples throughout the field.

Procedure for the Yield Component Method

Step 1. At each estimation site, measure a length of row equal to one-thousandth of an acre. For a 40-inch row (3.33 feet) row width, this equals 13.1 feet. For other row widths, divide 43,560 by the row spacing in feet and then divide that result by 1,000 (Table 1).

Step 2. Count and record the number of harvestable ears in the thousandth acre. Make sure you count ears and not plants. Many times, a plant will not have an ear present due to emerging later than the surrounding plants. Avoid counting lodged plants unless you are confident the combine header will be able to gather them.

Step 3. On every fifth ear, count the number of complete kernel rows and the average number of kernels per row (Figures 1, 2, and 3). Multiply the number of rows on each ear by the number of kernels per row to calculate the total number of kernels per ear.

Step 4. Calculate the average number of kernels per ear by adding the values for all the sampled ears and dividing by the number of ears.

Step 5. Estimate the yield for each site by multiplying the number of ears by the average number of kernels per ear. Next, divide that result by a number from the growing conditions list (Table 2). For the field you are estimating, select the number from the list that best represents the current year’s kernel set and grain fill conditions. The values below represent the range in numbers of kernels (thousands) in a 56-pound bushel of corn.



Figure 1. Sampling every fifth ear keeps you from selecting only the larger ears.



Figure 2. There are 16 rows on this ear.



Figure 3. There are about 35 kernels per row on this ear.

Table 1. Determining Row Length to Equal 1/1,000 Acre.	
Row Width (inches)	Length of Single Row to Equal 1/1,000 Acre
20	26 feet, 2 inches
30	17 feet, 5 inches
36	14 feet, 6 inches
38	13 feet, 9 inches
40	13 feet, 1 inch

Table 2. Growing Conditions, Range in Kernel Number Per Bushel.

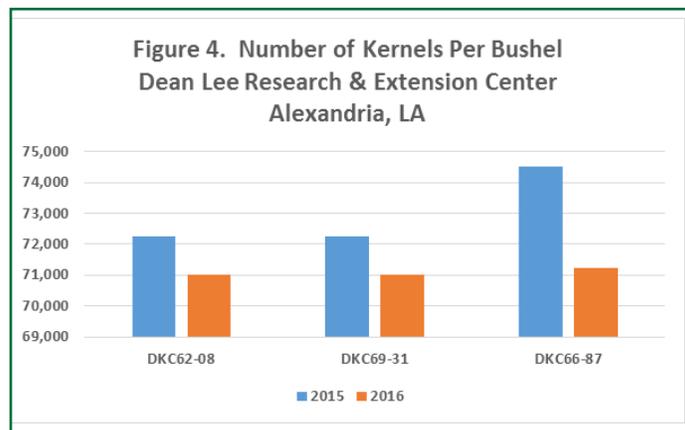
Excellent	75 ¹
Average	75 to 85
Poor	more than 90

¹ The values above represent the range in number of kernels (thousands) to equal a bushel of corn which is equal to 56 pounds.

Example: You counted 33 harvestable ears at the first one thousandth-acre sampling site. The average number of kernels per ear, based on sampling every fifth ear in the sampling row, was 420. Next, we assume that growing conditions during grain fill were excellent. To estimate yield for that site, we would multiply 33 by 420, then divide that value by 75, which equals 185 bushels per acre.

$$\frac{(\text{ear \#}) \times (\text{avg. kernel \#})}{\text{value from above list}}$$

This method for estimating pre-harvest grain yield in corn provides only an estimate. Kernel size and weight will vary depending on the hybrid and environment (Figure 4). Depending on the year, you can easily overestimate or underestimate grain yields. Another factor is field variability related to plant stands and maturity. The more ears you sample in a field, the more accurate your harvest yield estimate.



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