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Converting Wet Corn Weight to Dry Corn Weight

(Bob Nielsen)

Corn is often harvested at grain moisture contents higher than the 15% moisture typically desired by grain buyers. Wetter grain obviously weighs more than drier grain and so grain buyers will "shrink" the weight of "wet" grain (greater than 15% moisture) to the equivalent weight of "dry" grain (15% moisture) and then divide that weight by 56 to calculate the market bushels of grain they will purchase from the grower.

The two sources of weight loss due to mechanical drying are 1) the weight of the moisture (water) removed by the drying process and 2) the anticipated weight loss resulting from the loss of dry matter that occurs during the grain drying and handling processes (e.g., broken kernels, fines, foreign materials). An exact value for the handling loss, sometimes called "invisible shrink", is difficult to predict and can vary significantly from one grain buyer to another. For a lengthier discussion on grain weight shrinkage due to mechanical drying, see Hicks & Cloud, 1991.

The simple weight loss due to the removal of grain moisture represents the greatest percentage of the total grain weight shrinkage due to drying and is easily calculated using a handheld calculator or a smartphone calculator app. In general terms, you first convert the "wet" weight (greater than 15% moisture) to absolute dry weight (0% moisture). Then you convert the absolute dry weight back to a market-standard "dry" weight at 15% grain moisture.

Concept:

1. The initial percent dry matter content depends on the initial grain moisture content. For example, if the initial grain moisture content is 20%, then the initial percent dry matter content is 80% (e.g., 100% – 20%).
2. If the desired ending grain moisture content is 15% (the typical market standard), then the desired ending percent dry matter content is 85% (100% – 15%).
3. Multiply the weight of the "wet" grain by the initial percent dry matter content, then divide the result by the desired ending percent dry matter content.

Example:

1. 100,000 lbs of grain at 20% moisture = 80,000 lbs of absolute dry matter (i.e., 100,000 x 0.80).
2. 80,000 lbs of absolute dry matter = 94,118 lbs of grain at 15% moisture (i.e., 80,000 / 0.85).
3. 94,118 lbs of grain at 15% moisture = 1681 bu of grain at 15% moisture (i.e., 94,118 / 56).

One take-home reminder from this little exercise is the fact that the grain trade allows you to sell water in the form of grain moisture… up to a maximum market-standard 15% grain moisture content (or 14% for long term storage). Take advantage of this fact and maximize your "sellable" grain weight by delivering corn grain to the elevator at moisture levels no lower than 15% moisture content. In other words, if you deliver corn to the elevator at grain moisture contents lower than 15%, you will be paid for fewer bushels than you otherwise could be paid for.

Related reading

Hicks, D.R. and H.A. Cloud. 1991. Calculating Grain Weight Shrinkage in Corn Due to Mechanical Drying. National Corn Handbook Publication NCH-61. https://www.extension.purdue.edu/extmedia/nch/nch-61.html [URL accessed Sep 2019]

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Stress During Grain Fill: A Harbinger of Stalk Health Problems

(Bob Nielsen)

Harbinger. [hahr-bin-jer] noun
Anything that foreshadows a future event; omen; sign: *Frost is a harbinger of winter.*
Collins English Dictionary – Complete & Unabridged 2012 Digital Edition. at Dictionary.com, LLC.
http://dictionary.reference.com/browse/harbinger (accessed: Sep 2019).

Serious crop stress during the grain filling period of corn increases the risk of **stalk rots and stalk lodging** (breakage) prior to grain harvest. Examples of such serious stresses are nitrogen deficiency, foliar diseases (e.g., gray leaf spot, northern corn leaf blight, tar spot), defoliation by hail, excessively wet soils due to heavy rains, excessively dry soils due to drought, excessive heat, and lengthy periods of cloudy conditions. The effects of dry weather during grain filling on corn stalk health are accentuated in fields where root development and depth were restricted earlier in the season or, obviously, in fields with sandy soils and minimal water-holding capacity. Early-season root restriction can occur in response to saturated soils and/or shallow layers of compacted soil.

What these crop stresses share in common is that they can significantly reduce **photosynthesis** and, thus, the resulting carbohydrates necessary for dry matter deposition into the kernels. During grain filling, the developing kernels are a significant **photosynthetic "sink"** for the products of photosynthesis and respiration. Corn plants prioritize the movement of these photosynthates to the kernels, even at the expense of not maintaining the cellular health of the stalk, leaves, and roots.

When **photosynthetic capacity** decreases significantly during grain fill as a result of **serious photosynthetic stress**, plants often respond by **remobilizing non-structural carbohydrates** from stalk and leaf tissues to supply the intense physiological demand by the developing grain on the ears. **Fields at high risk** for weakened stalks and stalk rot development are those whose plants have "set" fairly decent ears (e.g., ears with a lot of kernels.) In addition to **physically weakening the stalks** of plants, the reduction in stalk carbohydrate concentrations and/or the consequent lower cellular maintenance of root and stalk tissues **increases the susceptibility of the plant to root and stalk rot diseases**.

NOTE: Even if significant stalk rot does not develop after carbohydrate remobilization from lower stalk tissue of stressed plants, the structural loss of stalk integrity itself greatly increases the risk of stalk lodging prior to grain harvest.

Severely stressed fields should be scouted in late August through early September to look for compromised stalk strength or the development of severe stalk rots. In years where crop development is delayed (like 2019), stalk quality problems may not appear until mid- to late September. Recognize that hybrids can vary greatly for late-season stalk quality even if grown in the same field due to inherent differences for late-season plant health or resistance against carbohydrate remobilization when stressed during grain fill.

Stalk breakage itself is easy to spot when walking a field. However, compromised stalks may stand unnoticed until that October storm front passes through and brings them to their proverbial knees. The simplest techniques for assessing stalk integrity involve either pushing on stalks to see whether they will collapse or bending down and pinching the lower stalk internodes to see whether they collapse easily between your fingers.

TIP: What works pretty well for me is to walk a field perpendicular to the row direction. Firmly pushing the stalks out of my way as I cross from one row to the other usually identifies weak stalks.

If possible, fields at high risk for stalk lodging or, obviously, already beginning to lodge should be harvested earlier than fields with lower risks of stalk lodging. This will minimize the risk of significant mechanical harvest losses resulting from downed corn.

Another side-effect of late-season stress during grain fill is that plants may simply "shut down" and mature prematurely, eventually evidenced by premature formation of kernel black layer (i.e., the visual indication of physiological maturity). The consequences of premature kernel black layer include not only lower grain yield, but also the likelihood of lower test weight grain.

Related Reading

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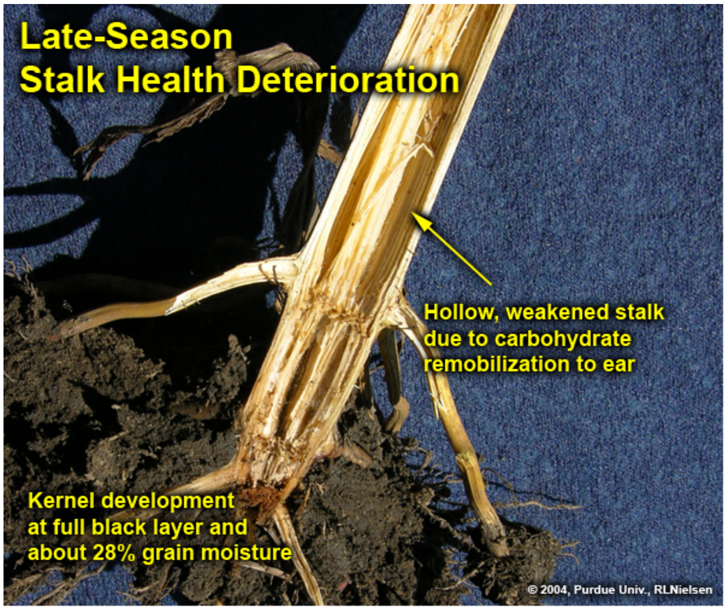
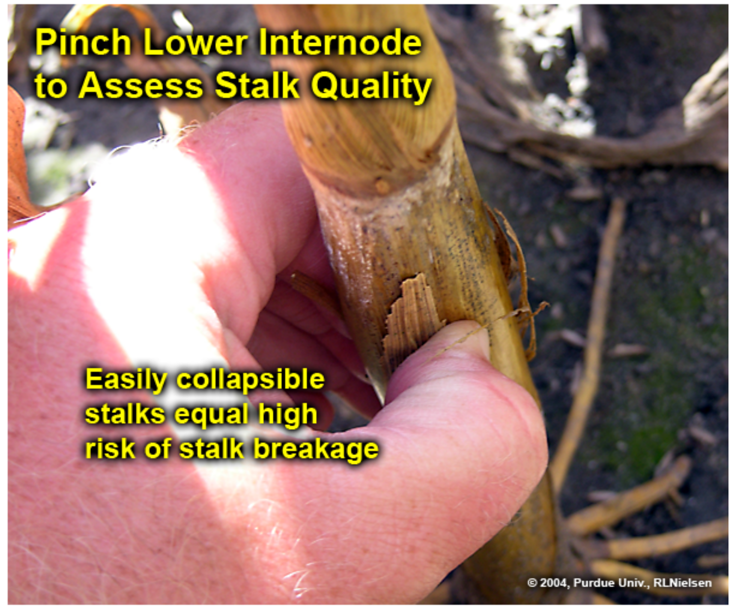


Hallowed out stalk.



Pinch lower stalk internode.

Closer look at hallowed out stalk.

Lodged plant caused by pushing hard.

Lodged plant caused by pushing hard.

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Editor: Tammy Luck | Department of Entomology, Purdue University, 901 W. State St., West Lafayette, IN 47907