



The time to scout for first hollow stem is now!

By Dr. Jeff Edwards, OSU Small Grains Extension Specialist

First hollow stem (FHS) is the wheat developmental stage that has been determined to be the optimal timing for removal of cattle from wheat pasture (see discussion on page 2). We do not know exactly how environmental and genetic factors interact to determine FHS, but early planting, plentiful rainfall, and warm weather generally favor early onset of FHS.

Recent hollow stem measurements taken at Stillwater, OK indicate that some varieties such as Fannin and Overlay have already reached FHS (Table 1). These data were taken from 10 random samples in each variety. As indicated by the standard deviations, there was some variation within each variety, so it is important to check multiple samples when scouting for FHS.

This particular location was planted September 16, 2004 and received 200 lb/ac of pre-plant nitrogen, so these results may indicate a worst-case scenario regarding FHS (*i.e. wheat at this location may be slightly more advanced than most locations*). Nevertheless, *the data clearly show that field scouting for FHS should begin immediately!* Additional newsletters will follow over the next few weeks to keep you updated on what we are finding, but the best place to determine FHS is in your own field.

Table 1. Average, minimum, maximum, and standard deviation of 10 hollow stem measurements per variety on February 15, 2005 at Stillwater, OK.

Variety	Average observed	Minimum observed	Maximum observed	Standard Deviation
	-----cm of hollow stem [†] -----			
2137	0.6	0.5	1.0	0.2
2145	1.2	0.5	1.7	0.4
2174	0.5	0.1	0.9	0.2
AP502CL	0.7	0.5	1.0	0.2
Avalanche	0.9	0.4	1.4	0.3
Custer	1.2	0.8	1.6	0.2
Cutter [‡]	2.2	1.0	3.7	1.0
Deliver	0.7	0.3	1.3	0.3
Endurance	0.7	0.4	1.9	0.4
Fannin	1.9	1.2	3.0	0.6
Ike	0.2	0.0	0.4	0.1
Intrada	1.8	1.0	2.7	0.5
Jagalene	1.4	0.9	1.7	0.3
Jagger	1.5	1.0	2.0	0.3
Lakin	0.3	0.0	0.6	0.2
Ok101	1.0	0.5	1.7	0.4
Ok102	0.5	0.3	0.7	0.1
Overlay	2.3	1.0	4.8	1.1
Stanton	0.6	0.4	0.9	0.2
Sturdy2K	0.1	0.0	0.3	0.1
TAM110	1.1	0.9	1.5	0.2
TAM111	0.5	0.2	0.8	0.2
Thunderbolt	0.6	0.1	1.1	0.3
Trego	0.6	0.4	0.8	0.1

[†] Varieties are considered to be at the First Hollow Stem stage of growth once 1.5 cm of hollow stem is observed. Research has shown this is the optimal timing for removal of cattle from wheat pasture.

[‡] Varieties at or past First Hollow Stem are shaded.

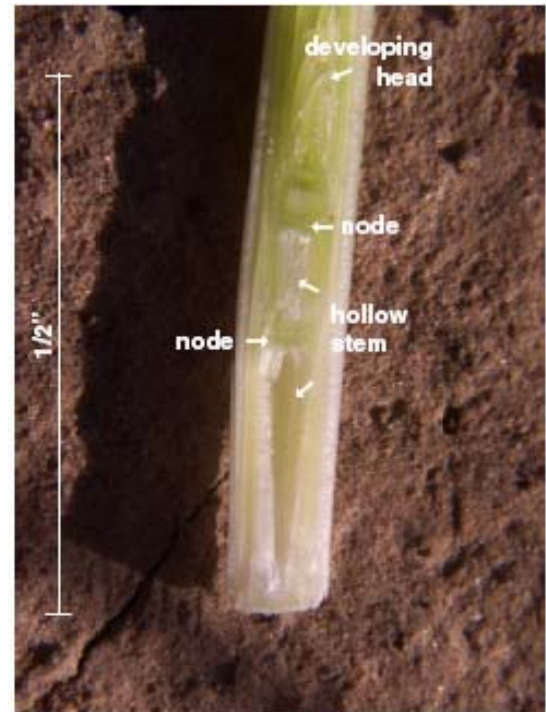
First hollow stem explained

Taken from OSU Cooperative Extension Service publication number L-309.

Gene Krenzer, Derrell Peel, Gerald Horn, and Francis Epplin.

Determining First Hollow Stem

First hollow stem (FHS) is the growth stage when hollow stem can first be identified above the root system and below the developing head. FHS occurs when the developing head is still below the soil surface. To check for FHS, dig up a few **ungrazed** wheat plants. Cut them off just above the root system. Starting where you cut off the wheat shoot, cut vertically, as near center as possible, toward the youngest leaves. Look for the very small growing point or developing head. Next, determine if any hollow stem is found between the growing point and where the root system was attached. If between 1/4 and 3/4" of hollow stem is present, the wheat plant is at FHS. The photograph is an example of FHS, enlarged considerably. It is important to check for FHS where cattle are not grazing, because grazing delays FHS, and grain yield losses occur before one can identify any hollow stem in wheat being grazed. Producers should begin looking for FHS with the first flush of growth in the late winter. Weather from January through FHS has the biggest influence on the date of FHS. First hollow stem has occurred as early as February 20 and as late as March 25 in twelve years of observation at the Marshall Wheat Pasture Research Unit. This tremendous difference emphasizes that calendar date is unreliable in determining when to terminate grazing.



First hollow stem stage of growth.

The Dilemma

Maximizing profits in dual-purpose wheat systems involves tradeoffs between grain and stocker production. One of the most critical decisions is grazing termination. More grazing days usually enhances stocker profitability, but maybe not the overall profitability. Biology of wheat growth imposes a rigid deadline for removing cattle without seriously reducing yield. Wheat growing conditions vary each year and the tendency to terminate grazing based on a fixed calendar date means that in some years profit is likely to be reduced.

Where is the Tiny Head?

What is happening in the growth of the wheat plant at first hollow stem (FHS)? If the wheat has not been grazed, the young head is developing and starting to be pushed up above the soil surface as the stem elongates. In wheat grazed all winter, elongation of the stem does not begin nearly as early as in the ungrazed wheat. We might interpret that there would be no problem allowing the cattle to continue grazing, because they certainly cannot graze off the tiny head if it is still below the soil surface.

Do Cattle Graze the Heads?

Historically, we thought that as long as the cattle were not grazing off the tiny wheat head, grazing did not reduce grain yield. However, in the last 15 years, we learned this was simply not true. It was discovered

that grazing past the FHS stage in ungrazed wheat reduced the wheat yield 1.25 bushels per acre per day, without grazing off any of the tiny heads. Apparently, grazing at this time **reduces the grain yield** because cattle are eating the leaves that produce photosynthate needed to grow the upper leaves of the wheat plant and help the head grow and fill.

Fewer, Smaller Heads

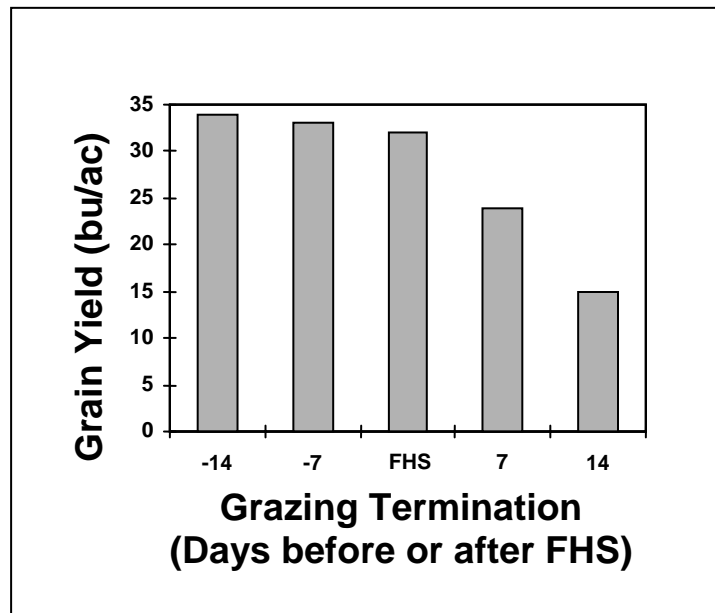
Two things are observed when we graze too long: 1) fewer heads per acre and 2) smaller and lighter heads than expected. As cattle continue grazing, the wheat plant is stressed and begins to abort some of the tillers that would produce grain. A little later, if there is not enough photosynthate, the plant begins aborting the lower spikelets (flowers where seed develops) on each head. Finally, if there is not enough photosynthate during grain filling, the seed size will be reduced and if the stress is severe enough, some seed will abort.

Lower Grain Yield

Once FHS stage is reached in ungrazed wheat, continuously grazed fields will suffer dramatic grain yield reduction. The average decrease is 1.25 bushels per acre per day for the first two weeks after FHS (see graph).

Stocker Profitability

The impact of early grazing termination on stocker profits depends on many factors, including cattle size, rate of gain, stocking rate, wheat pasture value and cattle market trends. Stocker budgets for 1993-2002 indicate that terminating grazing two weeks early reduces profit by an average of \$11.53/acre based on typical assumptions including: 425-pound steers grazing 126 days; gaining 2 pounds/day; and normally marketed the first week of March.



Economic Summary

An arbitrary fixed date of grazing termination reduces returns over time. Early termination reduces beef returns and late termination reduces grain returns. *Maximizing profits from dual-purpose wheat means that a producer must monitor wheat for FHS and remove cattle promptly when FHS occurs.* If FHS occurs two weeks early only one year in five, total returns (gain + grain) over five years are increased by about \$45/acre, or \$9/acre/ year when grazing is terminated early to match FHS.

Conclusion

There is no way cattle can make enough money in two weeks at the end of the grazing season to recover losses from wheat incurred by grazing two weeks after first hollow stem!

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