

Grain Sampling for DON Analysis

What is DON? Deoxynivalenol (DON), sometimes referred to as vomitoxin, is a mycotoxin that may be produced in wheat and barley grain infected by the Fusarium head blight (FHB or scab) fungus, *Fusarium graminearum*. The occurrence of FHB in the field does not automatically mean that DON is present in the grain, but a high level of infected kernels in the harvested grain means DON likely will be present. The US Food and Drug Administration (FDA) has established DON advisory levels to provide safe food and feed. In addition, the grain and malting industry may have more rigorous standards for DON levels in their purchased grain.

How is DON determined? DON is measured in grain via several laboratory methods, such as ELISA (Enzyme Linked Immunosorbent Assay), a FluoroQuant test, or gas chromatography-electron capture (GC-EC) and gas chromatography-mass spectrometry (GC-MS) analytical methods. Grain elevators, private labs, grain industries, and university testing labs may provide these tests. Regardless of methods used for analysis, the key to getting reliable and representative DON results lies with grain sampling. Sampling error can be a significant source of variation in DON levels.

Grain sampling for DON determination begins in the field and continues at the elevator or mill.

Field harvest effects on DON results: Producers may reduce the risk of high DON levels in the majority of their harvested grain by careful harvest methods. Often field margins or low levels of the field have been shown to have higher FHB severity and DON levels, in part due to possibly denser stands along field margins (headlands area) or because of higher prolonged humidities in low lying areas. Producers may choose to harvest these areas separately from the majority of their field, thus keeping more diseased grain separate from sounder grain, and reducing the risk of higher DON levels throughout the majority of harvested grain. In addition, producers may choose higher air speeds on their field combines, to prevent the low test weight, scabby kernels from being harvested. Post-harvest grain cleaning also is an option for removing low test weight infected kernels, especially if gravity tables are available.

Grain sampling at elevator or mill to get representative DON: To achieve a more accurate DON level estimate, it is critical that the collected grain sample be representative of an entire truckload or bin of grain. Grain and other particles, such as weed seeds, separate based on particle size and density as they flow and settle into a truck or bin. Smaller, denser material often may be found the center of the truck or bin, and this is the material that is often higher in DON content.

End-gate sampling: For sampling from an end gate grain stream, samples from the entire width and depth of the grain stream should be collected, not just the first and last portion of the load. A Pelican sampler or other sampling device aids in proper sample

collection and at least four samples of the entire grain stream should be collected at intervals to represent spatial different portions of the load.

Probe sampling: *The probe is the only sampling method approved by USDA-GIPSA (United States Dept. of Agriculture's Grain Inspection Packers & Stockyards Administration) for stationary lots.* Multiple (5-10) probe samples are generally recommended to obtain the best representative samples. GIPSA has specific recommendations for probe sampling of trucklots of barley and wheat for DON. Included in these recommendations are descriptions of sampling probes, sampling patterns, and sample preparation, including appropriate cleaning, dividing and grinding of the samples. Probes should not be taken from the center or outer portions of a load because these areas do not reflect a cross section of the load. Also, GIPSA recommends a minimum 100 gram, cleaned sample be used for testing. GIPSA's specific guidelines can be found at the link listed below. Other useful web-based links on grain sampling and DON also are provided.

USDA-GIPSA

Testing Trucklots of Barley and Wheat for Deoxynivalenol (DON)

http://www.gipsa.usda.gov/GIPSA/documents/GIPSA_Documents/don.pdf

NORTH DAKOTA STATE UNIVERSITY

DON (Vomitoxin) in Wheat -- Basic Questions and Answers

<http://www.ag.ndsu.edu/pubs/plantsci/pests/pp1302w.htm>

OHIO STATE UNIVERSITY

Where to Send Grain Samples for Mycotoxin Analysis

<http://www.oardc.ohio-state.edu/ohiofieldcropdisease/wheat/mycotoxin%20text2.htm>

MICHIGAN STATE UNIVERSITY

How to Sample Wheat to Accurately Determine Vomitoxin Levels

<http://web1.msue.msu.edu/imp/modab/26309701.html>

US WHEAT AND BARLEY SCAB INITIATIVE (USWBSI)

Early Detection of Deoxynivalenol in Wheat

http://scabusa.org/pdfs/forum_01_proc_fstu.pdf