



Cereal Grain Quality Evaluation Sample Report Form

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Lab ID	Sample Description	Grain Moisture	Test Weight	Starch	Crude Protein	Falling Number	DON
		%	lbs/bu	%	%	seconds	ppm
C4184	Redeemer	12.2	60.8	58.32	13.73	425	<0.5

Starch and crude protein reported at 'as-is' moisture content.

According to the USDA, DON values over 1 ppm are NOT considered safe for human consumption. Results with >5.0 ppm could be much higher than 5 ppm.

Please note: results are representative of the submitted sample only.

For information about our testing procedures please see the reverse side.

Questions? Please contact Hillary Emick at hillary.emick@uvm.edu or Heather Darby at heather.darby@uvm.edu.

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Interpreting Your Cereal Grains Quality Test Results

This page provides supplemental information about the results of the sample(s) you submitted to the E.E. Cummings Crop Testing Lab. An explanation of the quality testing parameters and methods follow.

Grain Moisture (%): Determining moisture content is an essential step in analyzing flour quality since this data is used to standardize other tests and is an indicator of grain storability. Whole grains and flour with high moisture content (greater than 14.5%) attract mold, bacteria, and insects, all of which cause deterioration during storage. In the lab, we use a Dickey-John mini-GAC Moisture and results are reported in percent.

Test Weight (lbs/bu): Test weight is a measure of the grain density recorded in pounds per bushel at 'as-is' moisture content. We use a Dickey-John mini-GAC to determine test weight. The test weight is a general indicator of grain quality; higher test weight generally means higher quality grain. Minimum test weights for US Grade 1 grains include:

- Wheat = 60 lbs/bu
- Barley = 48 lbs/bu
- Oats = 32 lbs/bu
- Rye = 55 lbs/bu
- Corn = 56 lbs/bu

Protein and Starch (%): The lab uses a Perten Inframatic 9500 NIR Grain Analyzer to analyze grains for protein and starch content. Protein content is crucial for determining grain quality. In general, higher protein indicates higher quality wheat. Most commercial grain mills target 12-14% protein. Protein content is a key specification for wheat and flour buyers as it can affect flour processing properties like water absorption, gluten strength, texture, and appearance. Wheat is generally between 50-70% starch. The ideal for protein for malting barley is lower than wheat at 9-11%. Starch content over 60% is desirable for barley.

Falling Number (seconds): The determination of falling number (AACC Method 56-81B, AACC Intl., 2000) is measured on the Perten FN 1500 Falling Number Machine. The falling number is measured by the amount of time, in seconds; it takes for a plunger to fall through a slurry of flour and water to the bottom of the sample tube. This value gives an indication of the amount of sprout damage and the resulting increases in alpha amylase activity that has occurred within a grain sample. In general, a falling number of 350 seconds or longer indicates low enzyme activity and sound wheat. As the amount of enzyme activity increases, the falling number decreases. Falling numbers below 200 seconds indicate high levels of enzyme activity and much sprouting damage. The falling number results are reported on a 14% moisture basis.

DON (ppm): Deoxynivalenol (DON), also referred to as vomitoxin, is a mycotoxin that can be produced in grain infected by *Fusarium* fungus. DON concentrations are analyzed using Veratox DON 2/3 Quantitative test from the NEOGEN Corp. The results are expressed in parts per million (ppm). The U.S. Food and Drug Administration (FDA) has established DON advisory levels to provide safe food and feed – human food products are restricted to a 1 ppm level; 10 ppm level is set for grains destined for cattle older than 4 months and for poultry (provided it does not exceed 50% of the diet); and 5 ppm level is set for grains destined for swine (not to exceed 20% of the diet) and other animals (not to exceed 40% of the diet).

Aflatoxin (ppb): Aflatoxin is a mycotoxin produced by *Aspergillus* molds. In high concentrations, aflatoxin can be deadly and exposure over time to even low levels is linked to liver cancer and other health issues. *Aspergillus* is not commonly found as a field infection in small grains and is typically a result of storage at moisture content over 14%. Aflatoxin concentrations are analyzed using the Veratox Quantitative test from the NEOGEN Corp. The results are expressed in parts per billion (ppb). The U.S. Food and Drug Administration (FDA) has established aflatoxin limits of 20 ppb for human consumption.

Seed Purity (%): The lab uses the ISTA method which determines the percentage by weight of pure seed, other seeds, and inert matter. Pure seed indicates only the grain type, not the genetic purity of the variety indicated. Other seed may include other crop seed or weed seed. Inert matter includes broken seed.

Small grain samples are ground into flour using the Perten LM3100 Laboratory Mill for testing falling number and toxins.