

Falling number grain quality test gets a tweak from researchers

□ By Sharon Durham, Agricultural Research Service – USDA

SCIENTISTS and engineers at the USDA Agricultural Research Service (ARS) have developed a more precise method to determine a major factor in grain quality. Quality testing is dependent on accurate and repeatable tests that assure a fair marketing system. That also means tests are always tweaked and improved to meet the needs of the industry.

The recent advancement deals with a test known as ‘falling number’ (FN).

FN is a procedure used worldwide to characterise the suitability of wheat for processing into foods such as pan and flat breads, noodles, biscuits and cakes. The procedure relies on the heating of watery mixtures of starchy materials – like wheat flour – in a boiling water bath.

The ‘falling number’ is literally the number of seconds it takes a standardised object to ‘fall’ through a heated wheat meal-water mixture undergoing starch gelatinisation and the enzymatic breakdown of the starch molecule.

The longer the object takes to fall – a measure of its viscosity – the better the quality of the sample and the grain lot it represents.

Through experimentation in a low-pressure chamber, US Department of Agriculture’s ARS agricultural engineer Steve Delwiche and his team at the Food Quality Laboratory in Beltsville, Maryland, developed the correction so that FN results can be expressed at equivalent laboratory conditions, such as what exists at sea level.

Local environment and the Falling Number test

Barometric pressure variation caused by laboratory land elevation and local weather patterns means that the thermal conditions of this test can vary, as can the reported FN.

Depending on the land elevation of the laboratory performing the FN test, some grain samples on the margin may fall above the

specification, but when evaluated at a different laboratory – for example at a sea terminal – the result may fall on the other side.

This can lead to uncertainty and inefficiency in the market system. Commonly in the US, wheat samples with FN below 300 seconds are discounted by US\$0.25 per bushel (A\$13 per tonne).

A new mathematical correction addresses this variation problem.

Starting in May 2019, USDA’s Federal Grain Inspection Service (FGIS) will implement the correction. Likewise, the American Association of Cereal Chemists International (AACCI) has amended their ‘Approved Method’ on FN as an optional correction.

The impact at the farm gate

Wheat grown in the US Pacific Northwest (PNW – Washington, Oregon, and Idaho) is annually worth around US\$1.5 billion at the farmgate. Most of this PNW wheat crop is exported overseas and is desired for its highly prized characteristics in end-product quality.

PNW wheat tends to be grown at higher elevations than other regions in the US. So, too, are the locations of the laboratories that evaluate PNW wheat.

The high land elevations of grain inspection laboratories in this region result in lower water boiling temperatures, and hence longer ‘cook’ times during the FN operation.

Implementation of this correction by the grain industry will allow for more accurate management of wheat consignments, which, for samples in the PNW alone that give test results near the 300 second cutoff, may result in savings of US\$10 million recaptured to the growers in weather-challenged years that foster low FN wheat

The Agricultural Research Service is the U.S. Department of Agriculture’s chief scientific in-house research agency. ■



Wheat being tested for falling number. This test characterises the suitability of the wheat for processing into various foods such as bread, biscuits and cakes.



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