



Cornhusker Economics

Are You Paid for Your Hard Red Winter Wheat Quality? Yes, but indirectly.

Hard red winter wheat (HRWW) is the largest wheat class grown in the United States, with approximately 660 million bushels produced in 2020, representing about 36% of total U.S. wheat production (USDA ERS 2021). The world market is an important destination for U.S. HRWW. In 2020, exports of U.S. HRWW represented 52% of U.S. production and total U.S. wheat exports represented 13% of total world exports (USDA ERS 2021). U.S. HRWW differs from other wheat classes based on physical characteristics such as color, kernel hardness and planting season as well as consistency in producing end uses such as pan and hearth style breads, hard rolls, croissants, general-purpose flour and blending (U.S. Wheat Associates 2019). U.S. HRWW is divided into five numerical grades and a sample grade based on test weight and total defects, reflecting the physical conditions of the sample (USDA FGIS 2014). U.S. HRWW is also tested for several non-grade characteristics that may affect the wheat's milling and baking quality including dockage, moisture, protein, falling number, and color. These grade and non-grade characteristics are often used as indicators of the suitability of the wheat for milling and baking, and therefore, represent important factors in determining value. Wheat that is marketed to international buyers may require additional testing based on pre-established rules in each destination country.

When a wheat farmer delivers grain to an elevator in

the United States, at the minimum, they receive a settlement sheet listing the following U.S. standard grade factors:

- test weight
- total defects
- one non-grade factor: moisture content

Elevators may also report and assign premiums and discounts to the remaining non-grade quality factors, usually consisting of these factors:

- protein
- falling number

What is the issue?

With the settlement sheet information, farmers perceive the price they receive for their wheat is based only on the quality characteristics observed on the settlement sheet.

Objective

Our objective is to examine whether Hard Red Winter Wheat producers are paid for quality characteristics that are not present on the settlement sheet.

Wheat Quality Characteristics

We inspect three types of quality characteristics:

1) Conventional characteristics:

- test weight

- moisture
- protein
- falling number

2) Milling characteristics:

- thousand kernel weight, an indicator of flour yield
- percent large kernels, an indicator of milling yield
- Single Kernel Characterization System (SKCS) tests. SKCS tests inspect kernels for characteristics such as weight, diameter and hardness. The average SKCS is an indicator of milling yield and milling quality, while the SKCS standard deviation measures wheat consistency, effecting roller mill gap settings.

3) Baking characteristics:

- P/L ratio (level and square), where the P indicates resistance to break the dough and the L indicates the extensibility (i.e., stretch) of the dough, therefore, the P/L ratio represents the flour baking quality and the suitability of different end-uses (i.e., hearth breads or cakes) and is based on results obtained from the alveograph machine testing for gluten strength and quality.
- water absorption and indicates the amount of water needed to reach an optimum dough consistency
- mixing time and indicates the time it takes for a dough sample to reach optimum consistency
- mixing tolerance and describes the tolerance of the dough to over-mixing
- loaf volume, which measures the volume of a baked pan loaf, in cubic centimeters, from a given flour sample, indicating the functionality of the wheat in a baking application
- crumb grain and measures the quality of the interior, or crumb, of the baked pan loaf.

Note: For a complete description of the conventional and end-use characteristics see *WHEAT AND FLOUR TESTING METHOD: A Guide to Understanding Wheat and Flour Quality* (Wheat Marketing Center 2008).

What did we find?

With data on conventional, milling and baking quality

characteristics across the U.S. HRWW growing region from 2012 to 2019 we find evidence that conventional, milling and baking characteristics influence the local cash price. We also find that as harvest progresses, market quality information available to the industry influences price.

Findings indicate that U.S. HRWW growers are indirectly paid for milling and baking quality characteristics through an elevator basis. These findings can be used to help improve the transparency and efficiency of the HRWW pricing mechanism by moving relevant milling and baking characteristics to the settlement sheet. By adding milling and baking characteristics to the settlement sheets that contain a premium/discount schedule, producers are sent the signal that high-quality wheat is valued, therefore, incentivizing producers to grow wheat containing relevant milling and baking characteristics.

What milling and baking characteristics should be added to the settlement sheet? The first characteristic would be the one with the largest price effect and working down from there. We would suggest starting with high crumb grain, followed by mixing time and then SKCS diameter standard deviation, to name the first three.

For additional information

Follow the link to the article here: Roberts, S., K. Brooks, L. Nogueira and C.G. Walters. 2022. "The Role of Quality Characteristics in Pricing Hard Red Winter Wheat." *Food Policy*, 108 (2022) 102246. <https://doi.org/10.1016/j.foodpol.2022.102246>

Or for a copy of the article, please reach out to Lia Nogueira at lia.nogueira@unl.edu

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