



Wheat blending

Method allows millers to deliver consistent product to customers while minimizing raw material cost

by Mark Fowler

The current situation in the global wheat market challenges flour millers around the world to evaluate their wheat purchasing decisions much more critically than in the past. Higher prices, increased price volatility and greater options from more exporting countries requires buyers to look beyond their traditional wheat suppliers.

Buyers forced outside of their traditional buying patterns must ask difficult questions to determine the impact of sourcing different types of wheat. Changing wheat type or origin will alter the milling and baking quality characteristics impacting milling and baking performance. When defining the quality characteristics required by the miller and the baker, I suggest that there is not “good quality” or “bad quality” wheat, only different quality characteristics depending on variety, type, and country of origin to name a few. The challenge is to value these quality characteristics appropriately to make the best purchasing decision for the benefit of the miller, baker and consumer of the finished product. Blending wheat or flour to meet customer requirements is a critical part of the production process that enables millers to deliver consistent quality products to their customers. The blending objective must be properly defined to allow the miller to make the best blending decisions. Reasons for blending wheat and/or flour in the flour milling process fit into three categories:

- to deliver a consistent product;
- to develop a unique product; and
- to minimize raw material cost.

When making the critical decisions as to what wheat to purchase, the milling quality characteristics and the baking quality requirements as well as the cost implications should be evaluated. The objective is to produce flour to meet the customer requirements and expectations of quality and consistency while minimizing raw material cost.

MILLING CHARACTERISTICS

Optimal milling performance means maximizing extraction, which is to maximize the amount of flour extracted from the wheat purchased and processed. All wheat is not created equal. Variety, class and environmental conditions in which the wheat is grown all impact wheat quality characteristics impacting flour extraction.

Test weight (or hectoliter weight) is a measure of density. Al-



though not an exact science, test weight is an important measure of wheat quality and estimation of flour extraction. Higher test weight wheat is expected to yield more flour per bushel. However, test weight is only one of several measures of kernel size that should be considered. Thousand kernel weight (TKW), or the weight in grams of 1,000 wheat kernels, is a quality characteristic that complements test weight. Whereas test weight measures the weight per bushel or hectoliter, TKW represents the weight of individual kernels. In cases where the TKW is low and test weight is high, extraction will be lower. This is due to the fact that test weight is high because the average size of the individual kernels are smaller and more kernels are in the volumetric measure of a bushel or hectoliter.

There are additional tests, such as the kernel size distribution test that measures the percent of small, medium and large kernel in a sample of wheat. The single kernel characterization system (SKCS) measures individual kernel weight (mg), diameter (mm), length (mm) and hardness. These tests help to evaluate physical traits that impact the milling qualities of wheat. Individually, they are valuable, but combining more than one of these tests when evaluating the physical properties of wheat gives a more complete analysis and better estimation of flour extraction.

Another quality characteristic generally associated with wheat class is kernel hardness. Kernel hardness is many times measured in the percent of vitreous kernels. The hardness of the kernel does impact milling extraction. Generally, harder kernels have a higher flour extraction. The milling system can be adjusted to



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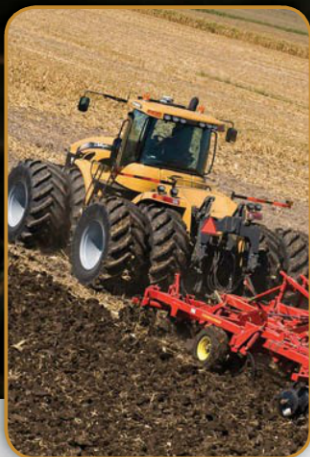
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maximize the extraction of softer wheat, but it is important to understand the impact of hardness when making a purchasing decision.

The final wheat quality characteristic to consider is the amount of impurities in the wheat shipment. The U.S. grading system measures impurities in several ways when grading the wheat. Dockage is removed prior to the grading of the wheat, and then shrunken and broken kernels are measured, foreign material is measured and other damaged kernels are counted. All of these together account for the screenings that are removed during the wheat cleaning process prior to milling. Other countries measure wheat screenings in different ways so it is important to understand these differences when evaluating the value of wheat from different countries.

BAKING CHARACTERISTICS

Milling properties are important, but

even more critical is producing flour with the baking quality characteristics required for the products it will be used to produce. Protein content is almost always considered in the purchase price and contract, but more important than protein content is the quality and functionality of the protein. When making purchasing decisions, it is absolutely critical to understand the differences in value and functionality in wheat of different classes or countries.

For example, the percentage of water absorption not only impacts product quality, but the value as well. Lower water absorption reduces the amount of water the baker can add when preparing the dough. Less water means less dough and that means fewer pieces to sell. Other dough characteristics such as mixing time and stability, viscosity, elasticity, extensibility and gluten strength all impact end product quality. Knowing not only the specific products the flour

customers are making, but the process that they are using to make their products is important. Increased mixing time lengthens the production cycle for the bakery. If each batch requires two minutes longer, or two minutes less to reach the optimal dough development, how does that impact the rest of the baking production line? Does the baker have the flexibility in the system to adjust to changes in dough viscosity?

An increasingly common solution to adapt to changes in wheat and flour performance is the use of flour improvers such as enzymes and other additives. In some cases, flour improvers are a good solution to flour inconsistencies or to utilize lower cost wheat. However, some markets and consumers are sensitive to the amount of ingredients used in the finished product. Simple, all-natural products are preferred. Knowing market preferences

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and labeling requirements is important before deciding to use flour improvers.

CONTROLLING COST

For both millers and bakers, getting the correct flour quality characteristics required to make best quality products for the consumers is the most important element when making purchasing deci-

sions. But in this time of higher prices and increased price volatility, everyone is concerned about cost.

In the end, the product produced must be acceptable to the consumers. Consistency is critical. Wheat purchasing plans with a long-term vision to deliver a consistent supply of wheat will lower the overall cost of flour production. Uni-

formity of the wheat to the mill will help to maximize yield and improve other measures of flour production efficiency such as mill utilization, downtime and energy consumption. Changing the types of wheat used in the mill blend will change the functional properties of the flour. When deciding what wheat to use, it is important to not only deliver a consistent quality of flour day to day, but consider the availability of different wheat options throughout the year.

Variations in the moisture, protein and density of wheat delivered to the mill can negatively impact mill balance and result in lower extraction rates and decreased flour output. But most importantly, if the flour produced is not consistent in the necessary dough quality characteristics required to make the end products, then the mill will not have satisfied customers.

So in the end, delivering a homogeneous mix of wheat to the mill at a competitive cost is crucial in delivering uniform flour to the customer with repeatable quality characteristics at the best price. Key requirements to making the best purchasing decisions are knowledge of the milling process and customer requirements for flour performance. To achieve good, cost-effective management of the wheat supply to the mill, the manager must have good knowledge of the wheat inventory and available supply, knowledge of the mill and elevator capabilities, knowledge of the market and of the customers.

The increased price volatility in the global wheat market and the ever-changing forecast of available inventory make purchasing decisions even harder. Buyers forced outside of their traditional buying patterns must have the knowledge to make the correct choice, for the success of the mill depends on successful customers. **WG**

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