The Changing Landscape of Grain-Based Foods: Creating Opportunity from Adversity

Colleen M. Zammer1,2 and Susan V. Kay1

Most manufacturers of grain-based foods and ingredients would agree that there is no shortage of challenges in the industry in which we compete. Once a beloved category of great tasting foods that had enough nutritional clout to form the foundation of the U.S. government approved Food Pyramid, we have experienced tectonic shifts in recent years that have left cracks in that foundation. When such shifts occur, it becomes imperative to reinforce the core and widen the pedestal upon which we stand, providing both strength and flexibility to better compete in a changing environment. Research, development, and innovation can serve as cornerstones from which relevant new products are produced and a competitive advantage is achieved.

As a miller of quality grains and flours since 1899, Bay State Milling has persevered through numerous changes in the industry, although none as dramatic as those experienced over the last decade. The Atkins diet and popular books such as Wheat Belly that challenge the very nature of our raw material base have led consumers to rethink their consumption of staple foods such as breads, cereals, and pastas. To adapt, we have had to think differently about our role as a miller. Traditionally only a liaison between the grain elevator and baker, we recognize that we must expand our thinking and value chain to remain relevant in today’s industry and provide solutions that help deliver foods that promote health, are affordable, and are palatable to consumers. We would like to share our unique perspective as a miller with you.

Changing Consumer Demands

In the past, the focus of millers was to deliver on the flour specifications requested by customers with year-round consistency. Millers would wait passively for their customers to tell them what their changing needs and desires were and would do their best to deliver the desired product. Today, consumers have access to more information regarding health, nutrition, and global trends, and their preferences are changing at a rapid pace. Waiting for customers to tell you what they need is no longer sufficient to keep up with market trends. Thinking like a consumer is vital to staying ahead of the commodity curve, and proactively developing and marketing solutions to meet customer and consumer needs is a defining difference between a partner and a supplier.

One could argue that industry trends have not changed that much over time because consumers still want healthier products that taste great and are convenient to consume. However, the ways in which these trends manifest themselves continue to morph. For example, the recession that began in 2008 made affordability a greater consideration in consumer food-purchasing choices. Furthermore, the 2010 USDA Dietary Guidelines for Americans showed a greater focus on whole grains and fiber and also recommended reduced consumption of popular grain-based foods that are high in fat, sugar, and sodium. Most recently, protein has become the food industry’s hero, and gluten has become the villain, which has added a whole new cast of characters within the grain-based foods industry.

These are just a few of the challenges facing the baking industry today. Because there is limited time to develop and launch new products to win over consumers before they move on to the next trend, solutions must be ready in advance of their demands. This requires an expanded skill set and rigorous product development process.

The Baker’s Conundrum

Product developers typically consider three major factors when developing their next “big idea”: ingredients, technology, and preparation processes. Innovation in at least one of these three categories may be required to fill functionality gaps that emerge when creating something new. Ingredients are the core of any food product, and the way in which ingredients are combined (use level, type, ingredient form, and processing parameters) will determine the finished product.

For core ingredients to deliver the desired attributes, developers or bakers often look to costly functional ingredients or dough additives. When it comes to grain-based foods, the largest ingredient component of the finished product is often wheat flour, which may have some shortcomings when it comes to meeting today’s consumer needs. Therefore, developers may need to seek out alternative flour products to meet their unique objectives, and by doing so, they may create a new product with a cleaner label, fewer allergens, cost savings, increased nutrition, and/or improved quality.

Every physical attribute of the flour and the raw material from which it is milled will affect the finished product. Common physical attributes include moisture, ash, protein (quality and quantity), starch damage, enzymatic activity, and particle size distribution, which millers can control by manipulating and optimizing mill settings. Traditionally, the role of the miller has been to deliver the desired attributes through wheat selection and blending, as well as particle size optimization. However, the current pace of new product development requires leveraging of the entire value chain through a combination of state-of-the-art milling technology, strong supply chain, consumer insights, and product application expertise to have tested solutions ready when new product opportunities are born, increasing new product success rates through speed to market.

Supply Chain Solutions

Although wheat continues to be an excellent source of flavor and nutrition in baked goods, meeting consumer needs for healthy, affordable, and palatable foods may require another look at the supply end of the value chain. Using the protein trend cited earlier as an example, consumers are not only seeking greater...
quantities of protein in their foods, but government programs such as the National School Lunch Program are also requiring protein with greater quality in foods. Wheat contributes \(\approx 11-14\%\) protein to grain-based foods but lacks a sufficient quantity of lysine, rendering it “incomplete.” Although the day may come when “complete wheat” containing all essential amino acids emerges from the fields, developers currently need to supplement their formulations with other sources of amino acids. A viable approach to improving the protein quality and quantity of grain-based foods is to use a combination of grain and legume flours and even milled seeds (Fig. 1).

The milling industry is typically thought of as encompassing commodity grains such as wheat and rye. However, a number of plant-based materials, such as grains, seeds, and legumes, that are making their way into the food supply can also be milled into flour using different techniques that still fall within the milling category. These materials may not function like wheat, but the application of an appropriate technology and formulation expertise can deliver foods with high protein quality and quantity from raw materials such as wheat, rye, rice, amaranth, quinoa, sesame, pumpkin, chia, and flax seeds, as well as garbanzo beans and peas.

Each of these materials has a unique color, flavor, and nutritional profile that can be used to help developers differentiate their products and offer a variety of marketing opportunities:

- **Attract attention.** In a crowded aisle that is a sea of beige and brown rectangles, different formats, colors, and toppings will catch a consumer’s eye:
  - Flat is the new fluffy—and functional too (e.g., wraps)
  - Seeds stand out when applied to tops and sides
  - Particulates add texture and flavor
- **Stake a claim.** The majority of grains, pseudocereal grains, legumes, and seeds provide protein, fiber, flavor, and a host of nutrients such as omega-3 fatty acids, antioxidants, and anti-inflammatory compounds with proven health benefits.
- **Set them free.** Most of these same grains, legumes, and seeds are also gluten-free, a trend growing in popularity among consumers (and their family and friends) with celiac disease, gluten sensitivity, or gluten intolerance.
- **Go global.** Grains such as spelt, rye, millet, amaranth, quinoa, and others also qualify as “ancient grains,” which are loosely defined as grains from a specific geographic origin that have not been subjected to modern agricultural practices. Their global origins appeal to consumers who are expanding their knowledge of the world and are trying foods from different cultures.
- **Go local.** Although initially sourced from specific regions around the globe, many grains, seeds, and legumes can be adapted to new growing regions and sourced to support local bakery brands.
- **Organic growth.** Ancient grains and seeds also appeal to manufacturers and consumers who want to avoid genetically modified ingredients. Given their smaller production volumes and often remote growing regions, many also qualify as organic because of the growing methods used by the farmers who produce them.

**Expertise in Nonwheat Ingredients**

Looking forward through the value chain, as millers expand their supply chains and technologies it is critical to know how these new ingredients will function in product applications. When ingredients are incorporated into a grain-based food system (conventional or gluten-free), it is important to understand the basic function of the ingredient and its overall function in the specific system. The same is true when incorporating nonwheat grains, seeds, and legumes. Because these nonwheat ingredients do not contain gluten-forming proteins, even minor use levels can drastically affect both the dough and the finished product. Every step along the way, the baker or product developer must know the effects these ingredients have on water absorption, makeup and handling characteristics, proofing, and baking and make adjustments accordingly. Finished product attributes that may be affected include volume, internal and external color, grain structure and texture, flavor, and shelf life.

Each nonwheat grain, seed, and legume has its own unique milling and baking characteristics and finished product attributes. Successfully working with nonwheat ingredients requires removing the conventional milling and baking hat and approaching product development as one would approach a completely new category of food. This approach can provide the head start that is needed to stay ahead of the curve and quickly deliver successful products to market.

**Change Cultivates Opportunity**

Whether we consider the changes taking place in the grain-based foods segment today as challenges or opportunities, it is clear that investing in people and innovation to take advantage of them affords the best possible outcome.

Change can be daunting, especially when it impacts the core of our product or expertise. Often we find ourselves in a position where we can no longer provide all of the knowledge, services, or products to our customers that we are accustomed to providing. We are not the first industry to go through such changes. The experiences of other industries show us that when gaps emerge as the result of change they can be bridged by collaborating with those who have the strengths we lack and that our industry can become a more robust entity as a result.

Today’s miller can provide more than conventional flour if given the right tools. An in-depth understanding and appreciation of all of the requirements that ingredients need to deliver against, from operational efficiency to food safety and quality and, finally, consumer delight, is of paramount importance. Partnerships with growers allow millers access to new raw materials from around the world, unlocking the treasure trove of flavors, nutrients, and functionality needed to meet today’s consumer demands, as well as those we haven’t even conceived of yet.

It is an exciting time to be associated with the challenges and opportunities presented by grain-based foods. Industry changes have afforded us not only the opportunity to ensure global consumer appetites are satisfied, but sated by health-promoting, affordable, and delicious foods. By working in concert across the value chain, we can turn these opportunities into reality, with benefits for all.