



# Bay State sees opening for innovation in wheat flour

Levangie describes great potential in HealthSense high-fiber flour

Even as the company aggressively has pursued non-wheat businesses in recent years, Bay State Milling Co. remains powerfully committed to flour milling, said Peter F. Levangie, president and chief executive officer.

In fact, Bay State continues to probe the flour milling business for opportunities to add value, with a particular focus on health and wellness.

In addition to organic wheat and whole wheat flour, sprouted wheat (and other sprouted grains) has been among products Bay State has been offering to satisfy consumer interest in health and wellness. Like whole wheat, sprouted wheat faces challenges.

"We have a line of sprouted ingredients that stretches across the entire product line, but has a strong focus on whole wheat," he said. "A heavy emphasis of ours is using sprouting grains to try to improve the taste and performance of whole wheat flour."

Mr. Levangie said flour from sprouted wheat has a slightly sweeter flavor profile than conventional whole wheat flour, but he also offered a clear-eyed assessment of both the positives of sprouted wheat as well as impediments that could hold the category back.

"It does have a sweeter taste, and there are a few other performance benefits," he said. "The challenge for that product line is that the underlying health benefit is not yet convincingly supported by science. It's more of a perceived benefit."

He said Bay State is taking care not

to claim beyond what scientific research will allow.

"Getting health claims is tough," he said. "So, our focus is about it being a better whole wheat flour."

A second impediment for flour from sprouted wheat is cost.

"The challenge is getting the cost-benefit right to scale," he said.

Beyond the challenges associated with whole wheat flour and flour from sprouted wheat, Mr. Levangie said difficulties in food ingredient innovation are heightened by rapid shifts in consumer demand.

"The consumer is becoming more fickle, dynamic, and brands and product lines increasingly come and go," he said.

Considering these challenges and thinking about opportunities in health and wellness, Mr. Levangie said Bay State is looking at what the company does as millers at the most fundamental level.

"We express the intrinsic value of a seed," he said. "That's what we do. We process it so that it becomes more functional, more edible. But the real magic always starts in that seed, and so we have become much more interested in taking more responsibility for the seeds that are actually producing the grain that we mill."

Efforts over the last 10 years around innovation in flour milling have centered on two new initiatives, beginning with increased collaboration with wheat breeders. Acknowledging the milling industry has a long history of working with breeders, Mr. Levangie said Bay State has become "more intentional" in seeking desirable attributes in wheat varieties.

"The industry is much more focused on that, too, which is great," he said.

Bay State has acquired germplasm it

hopes will lead to the development of promising wheat varieties and in 2015 launched a small seed business, Fifth Generation Seed, based in Yuma, Ariz. (about 175 miles southwest of Tolleson, where Bay State operates a flour mill).

Fifth Generation focuses on the development of grains, not only wheat, with beneficial customer and consumer-centric output traits such as baking performance, nutrition, color and flavor for differentiated grain-based foods.

"We're learning a lot about wheat breeding — what's possible, what's not possible," Mr. Levangie said. "We're trying to use that to address all sorts of issues, better milling quality wheat, wheat with better rheological characteristics, enhanced flavor, better baking and then arguably more nutritious wheat. We have used a few varieties internally for wheat blending to improve best-cost quality, but it will be years before we see big impacts."

A more recent wheat milling initiative, also highly innovative, appears to promise a shorter timeline to commercialization.

The company in 2017 said it was joining forces with Arista Cereal Technologies, a partnership between the Commonwealth Scientific and Industrial Research Organization (CSIRO) in Australia; the Grains Research and Development Corp. of Australia, which funds grains industry research and development; and Limagrains Céréales Ingrédients, a farmer-owned cooperative based in France that markets field seeds, vegetable seed and cereal products. The groups collaborated to develop a wheat variety with 10 times more fiber within the endosperm than what is in most wheat harvested today.

The new variety has amylose content

that allows Bay State to produce flour with 25% dietary fiber. The higher amylose content leads to a higher resistant starch content. Resistant starch functions like soluble fiber. Bay State has contracted with farmers across a number of states to grow several thousand acres of the wheat. The resulting flour is being marketed as HealthSense high-fiber wheat flour, with commercial quantities being available after the 2018 harvest.

The history of Arista starts with CSIRO, a governmental science agency in Australia. CSIRO increasingly had become concerned about unhealthy eating habits there, Mr. Levangie said. Meanwhile, another group in Australia, G.R.D.C., which Mr. Levangie described as akin to a check-off group, was concerned about competing in the global wheat market and the worsening public perception of grains.

"CSIRO was starting to wrestle with the growing incidents of obesity and what they can do about it," he said. "And G.R.D.C. was asking, 'How do we make wheat more marketable and differentiated in a globalizing economy?' And what these guys came up with is focusing on something that exists within every kernel of wheat and also other cereal grains."

Mr. Levangie said CSIRO spent a couple decades researching the opportunity and used conventional breeding techniques to select for the amylose trait to create wheat kernels in which the endosperm contains high levels of fiber.

"So the real benefit here is when you mill this high-amylose wheat, both as refined flour and then certainly of course in whole wheat, you now have a significant amount of the flour is resistant starch and therefore fiber," Mr. Levangie said. Bay State has been working on this initiative since 2014 and reached an official agreement in 2016.

Under its terms, Bay State is Arista's



Peter F. Levangie, Bay State Milling Co.

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exclusive North American commercial partner for all classes of wheat. Arista is the licensor and holds global patents on the process used to select for the trait. The relationship left Bay State with considerable work before HealthSense would be ready for commercial introduction.

"The best way to think about the challenge is essentially this business started with two bags of wheat, some hard red spring out of France, and hard white spring out of Australia, and a playbook," Mr. Levangie said.

The "playbook" is the patented guide to breeding high-amylose wheat, he said.

Like any wheat, HealthSense must be bred for numerous qualities necessary to meet the needs of different constituencies.

"It's complicated," Mr. Levangie said. "What we're really trying to do is create a flour that is both still functional but also deliver now this really important macro-nutrient and still be productive and

profitable for the whole supply chain. Whenever you start this kind of effort, the supply chains are small. All of this is contract grown. But we're commercializing and coming to market this fall."

Going back to his description of milling as expressing the intrinsic value of seeds, Mr. Levangie said Bay State has identified a way to elevate this value.

"We are making them functional, usable, tasty and now healthy for our food companies who are our customers," he said. "This HealthSense is totally changing our company."

Currently, HealthSense wheat is being planted in many parts of the country in hard wheat varieties — hard red winter and hard white spring.

"But we are looking to develop the trait in all classes of wheat, so soft, durum, but that will take more time," he said. "We are coming to market with those two classes, which makes sense for Bay State Milling. We are more of a hard wheat than a soft wheat miller."

Wheat used to produce HealthSense does not yet yield as well as popular wheat varieties, Mr. Levangie said.

"It is very expensive to produce right now, because it's new," he said. "There are important agronomic challenges, including less disease resistance. Still, the value of the additional fiber relative to incorporating fiber additives will make the HealthSense products competitive."

Baking qualities, though, are not holding back HealthSense, Mr. Levangie said.

"It's very functional, as functional as you would typically experience with flour," he said. "For example, HealthSense has high water absorption. It has some other interesting attributes as well."

Initial applications customers are



At the Rothwell GrainEssentials Center at Bay State Milling Co. headquarters in Quincy, Mass., from left, Thunyaporn (Naggie) Jeradechachai, Sean Finnie, Valerie Hawkes, Peter Levangie, Peter Banat and Vanessa Brovelli.

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exploring with HealthSense primarily have been tortillas, flat breads and pasta, though Mr. Levangie added, "We're trying everything."

Mr. Levangie said Bay State believes HealthSense will prove attractive to formulators who currently shun wheat.

"I hope some other food companies rethink the use of wheat in certain applications," he said. "I mean nobody trying to bring innovative products to the granola, nutrition bar and snack categories uses wheat anymore. Because now we can deliver a major macronutrient, maybe people will invent some new stuff."

Bay State is marketing HealthSense as a "better fiber alternative" than options available on the market today. For consumers, the product has particular appeal, Mr. Levangie said.

"HealthSense is much more socially acceptable than alternative fibers because it's slow digesting, fermentable," he said. "We are focused right now on trying to build this ingredient business as a better fiber alternative from the ones you are using today. So the markets we're mostly interested in are markets where flour and fiber additives already exist. So, if you think about high-fiber bread, the different fiber-intensive product lines that already exist, if they're using flour, and they are adding fiber, we want to talk to them."

Bay State continues to work on the fiber content of its HealthSense flour, Mr. Levangie said.

"The intent though is that if you use HealthSense's flour in an application, and bread being sort of a standard, you'll at least be able to make a claim of a 'good source' of fiber," he said. "In some applications we hope for excellent source. And these are some of the things we're still working on."

Viewed purely through an economic lens, Mr. Levangie said the market has established a wide differential between the value of whole wheat flour and fiber.

"We did a lot of work, using consumer data, and we hunted as best we could around foods where we saw both flour and fiber additives," he said. "For purposes of this product line being relevant to Bay State, you know fiber is a good size market. We can make a good living competing in the fiber business. It's cleaner label. We also think the importance of properly feeding the gut flora with resistant starch will increase the demand for products made with HealthSense over time. And once we scale it up, we believe it will be more cost effective than adding fiber."

Given what Mr. Levangie calls the "fickle" tendencies of consumers and food companies, will Bay State's multi-year focus on HealthSense pay off through a lasting business?

Bay State has benefited from the willingness of the Rothwell family to invest with an eye to the long term, Mr. Levangie said.



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Gathering with members of the Rea family in a field near Walla Walla, Wash., where the Reas are growing HealthSense wheat were representatives of Arista Cereal Technologies (developers of high amylose wheat), Limagrain Cereal Seeds (Bay State's seed breeding partner) and Bay State Milling employees involved in the HealthSense initiative.

"We've been at rigourously developing this product and the supply chain from seed to flour for four years, and I personally have been working on it for 10 years," he said. "And it hasn't contributed anything but cost. Not many companies would commit to that. And we're disciplined. We are certainly by no means under the same scrutiny as public companies to deliver quarterly, but we care about short-term results."

With its shift to specialized ingredients, Bay State has been "totally rethinking" its flour mills, Mr. Levangie said. He described these changes as evolutionary, in part because the company's long-time focus on sacked versus bulk flour has oriented its mills toward meeting the needs of smaller customers.

"We tend to have pretty flexible mills that are accustomed to doing smaller runs, and because we've been in the organic business a while, we have more experience in identify preserved wheat," he said. "HealthSense is a whole step up, so as others perhaps have been adding capacity, buying mills, we are more focused on preparing the mills that we have for the business that we're creating. That's repurposing some incremental expansions that we've talked about."

Investments have been required in enterprise resource planning systems to help manage the increasing complexity of the business, and additional storage has been added to the company's mills because of the increased need for segregation and separation of grain.

"A lot of thought shared by many individuals went into the strategy here," Mr. Levangie said. "What makes sense? What are its boundaries? What's in? What's out? That's a big part of the constant decision making here. Many things needed to come together to make all this possible."

Emphasis on a team culture versus an individual or top-down approach has been modeled by Mr. Levangie's predecessors and continues, he said.

"Probably the most exciting thing for me at Bay State is seeing more and more of our employees taking responsibility for the strategy," he said. "For example, we just won best new ingredient of year at Expo West for our SowNaked naked oat. The truth is I had nothing to do with that. A team of our people made this happen, and it will be a really nice business for us."

So, will Bay State's strategy succeed? Will the company thrive in a milling industry in which so many of its competitors are focused on consolidation or adding flour milling capacity?

Perhaps those who may be skeptical should remember Thoreau's famous indictment of conformity:

"If a man does not keep pace with his companions, perhaps it is because he hears a different drummer. Let him step to the music which he hears, however measured or far away."<sup>MBN</sup>

— L. Joshua Sosland



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