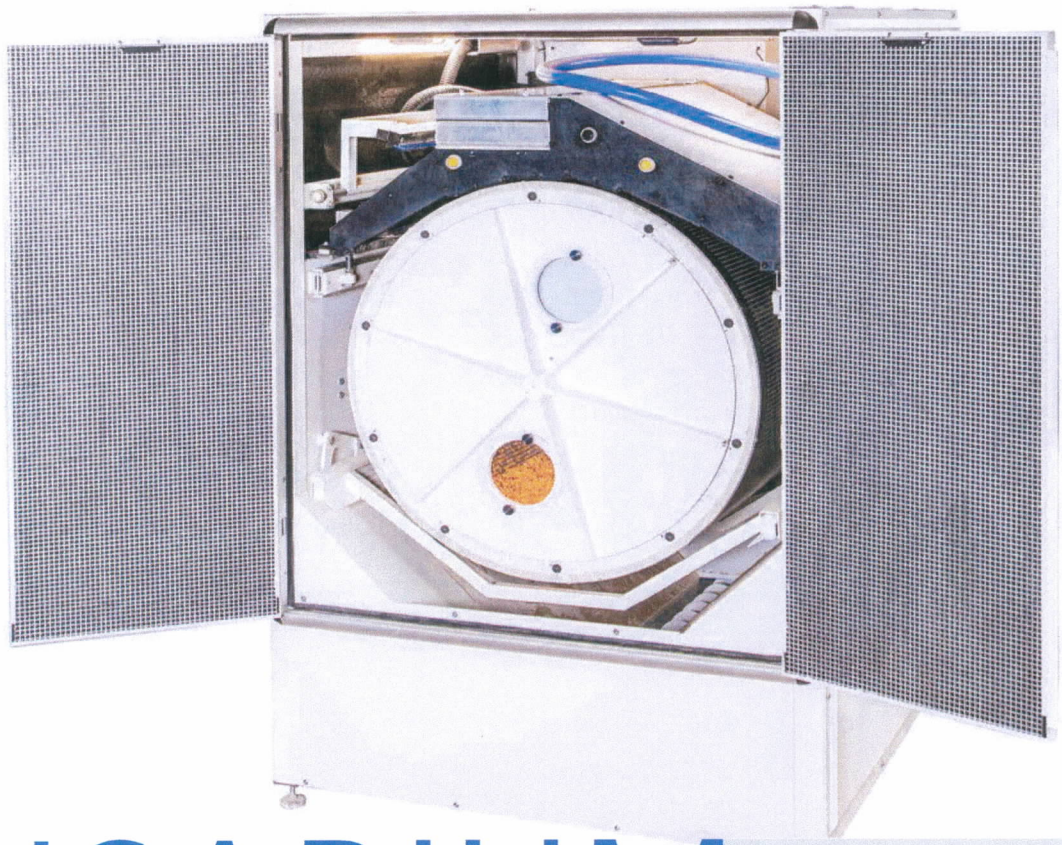

FUSARIUM detector

by Leo Quigley

A Swedish company has developed an efficient and effective method for sorting damaged and clean grains

Fusarium Head Blight entered Western Canada's primary grain growing area through the Province of Manitoba and has now spread across Saskatchewan and into Alberta. It's a fungus that is able to invade wheat, durum, barley, oats, rye, corn, triticale, canary seed and even some forage grasses. It comes in a variety of species – some of them toxic.

In some cases the damaged kernels that result from a Fusarium infection are called "tombstone kernels" that are shriveled, lightweight and pink or white in color.

Particularly worrisome is the fact that once a farm has been infected with Fusarium it's unlikely to ever become free of the blight.

Fusarium can produce mycotoxins that downgrade the value of grain. There are a number of species of Fusarium in Western Canada. Fusarium graminearum is considered the primary mycotoxin producer. The other species include: F. culmorum, F. equiseti, F. poae, F. avenaceum, F. acuminatum and F. sporotrichioides.

In an advisory to farmers from the Saskatchewan Department of Agriculture says: "Fusarium Head Blight (FHB) results in a reduction in yield, grade and end-use quality. Further losses to producers have occurred because of restricted crop rotations, limited variety selection, cost of control measures, as well as reduced marketing opportunities. It is important that producers are familiar with this potentially damaging disease and incorporate management practices

Swedish biochemist Bo Löfqvist developed the technology that makes the TriQ work. Photos courtesy of BoMills.

to reduce FHB development in their crops."

On the livestock side, the concern is not necessarily about Fusarium; the issue is with the mycotoxins that Fusarium can produce. The disease may produce a number of mycotoxins including zearalenones and trichothecenes. Zearalenone is a compound similar to estrogen. Its presence in feed can disrupt the estrus cycle. Sows are especially sensitive to this chemical. It has been associated with early embryonic death in some cases.

"Trichothecenes are comprised of several metabolites, including deoxynivalenol (DON or vomitoxin), diacetoxyscirpenol (DAS), T-2 toxin and HT-2 toxin. By far, DON is the toxin most commonly produced. In fact, the industry uses DON as a marker or an indicator that other toxins may be present. However, other toxins such as HT-2 can also be present at high levels in infected grain with no DON in the sample.

"DON is a relatively mild toxin. Animals consuming feed-containing high levels of DON may have a reduced immune response. Feed refusal is common. Swine are the most sensitive of the various species of livestock. Beef cattle can tolerate much higher levels of DON.

DON is found in the infected grain and chaff covering that grain. Little, if any, is found in the straw and leaves of the plant. DON and other mycotoxins can also be found in cereal green feed and silage if those crops were infected by Fusarium."

However, for grain farmers, the impact of Fusarium Head Blight is simple, if your load of grain is infected it will be downgraded or completely rejected. It's not something anyone wants in the food chain or in animal feed.

What grain farmers need is a machine that can sort through the load of grain, pick out the infected kernels and set them aside for disposal.

And, while it may sound fanciful, just such a machine has entered the Canadian market.

Developed by the Swedish biochemist Bo Löfqvist, the machine, called the TriQ, is able to sort through a batch of grain, examining every kernel and sorting them into separate lots according to quality. Even more remarkable, the machine learns as it sorts and becomes increasingly adept at sorting through a batch of grain at roughly 30 tph.

Recently the company, called BoMill AB, with its head office in Lund, Sweden, is making its machine available worldwide. They come in different sizes and are fairly pricey, however, Karin Wehlin, chief executive officer of BoMill points out that

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Karin Wehlin, chief executive officer of BoMills

being able to convert a truckload of wheat or barley from worthless waste to a saleable commodity is a process that, like alchemy turns lead into gold, can pay for itself very quickly.

"For example," Wehlin said, "If you had 5,000 tonnes of durum wheat downgraded to salvage, which has zero value, we could recover 65 percent of the crop into, in some cases, Number One durum.

"You could say it costs a lot, but it's not expensive," she said. "You could put it like that."

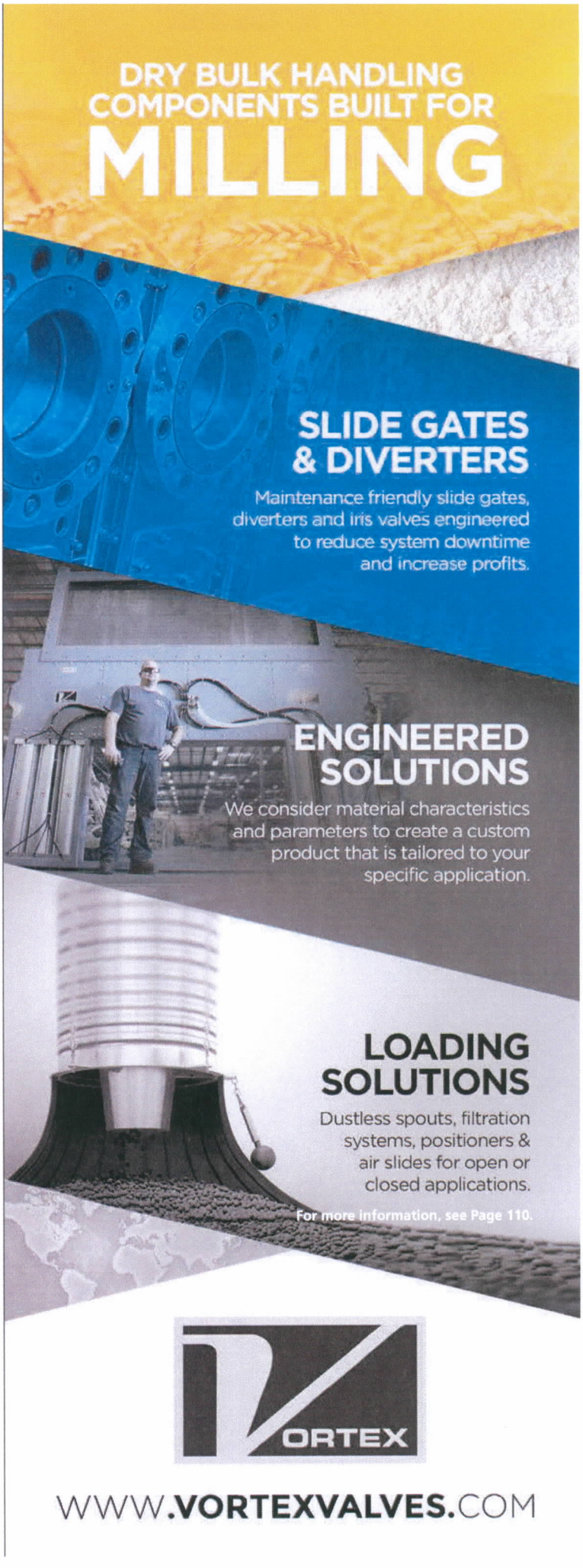
Wehlin said she expects that the number of diseases the TriQ, using infrared technology, can recognize and sort is likely to increase with time as grain farmers and the industry gain experience with the machine.

"We can sort 24,000 kernels a second per machine, she said. "The more experience we gain, the more applications that will be possible.

"It's revolutionary when you think about how you can handle your grain."

Wehlin pointed out that the TriQ, when it's not being used to pick out Fusarium infected kernels, can also be used to pick out those kernels with higher levels of protein that bring a higher price at market.

On March 5, 2015, the company announced that it had selected the Flaman Group of Companies, Grain Cleaning Division, as their Canadian distributor for the TriQ. In announcing the agreement, Warren Schmidt, manager of Flaman's Grain Division, said: "BoMill has a unique position in the market with its patented technology for grain quality sorting and we are excited to bring this to our customers. We believe



that the TriQ is the solution for all the Fusarium problems that we have seen."

Prior to putting the machine on the Canadian market, BoMill put it through trials at the University of Saskatchewan and at the Winnipeg-based Canadian International Grains Institute.

Rex Newkirk, PhD, Research Director at the Institute, said that before the technology provided by Bomill was available it was "virtually impossible" to remove the damaged seeds from a large quantity of grain; although the very light 'tombstone' kernels could be cleaned out with a gravity table.

"However, the (kernels) that are lightly infected, but still have the toxin, the gravity table won't touch.

"The other thing we were using was optical sorters that specifically look at the color of seeds and if the kernels are white and chalky, the optical sorter will take those out. But, if you've had any bleaching of the seed, the sorter can't tell the difference between a bleached seed and Fusarium-infected seed.

"So we have some technologies that are widely used in the industry that can take care of part of the problem, but with the Bomill we can shine a light through the seed and, on the other side of the seed, there's a chemical detector that can tell the chemical composition of that seed and we can look for ones that look different than a normal seed and say 'take those out.'"

One advantage of the Bomill is that the operator can change the quantity of infected kernels that are removed as the machine is running and adjust the composition of the cleaned product to existing grading standards and the current price to determine the optimum level of cleaning to provide the best return.

Disposing of the contaminated grain can also present a problem and, in some cases, there may be no alternative but to pay to have the grain, with its toxins, destroyed. However, Newkirk said the he has experimented with burning the grain in a controlled environment to make biochar. Not only was the grain turned into a useful product for gardening, but the heat that resulted from the process was used for home heating. WG

Based in Vancouver, British Columbia, Canada, Leo Quigley writes for a variety of national and international publications specializing in agriculture and transportation. He can be reached at Quigley@dccnet.com.

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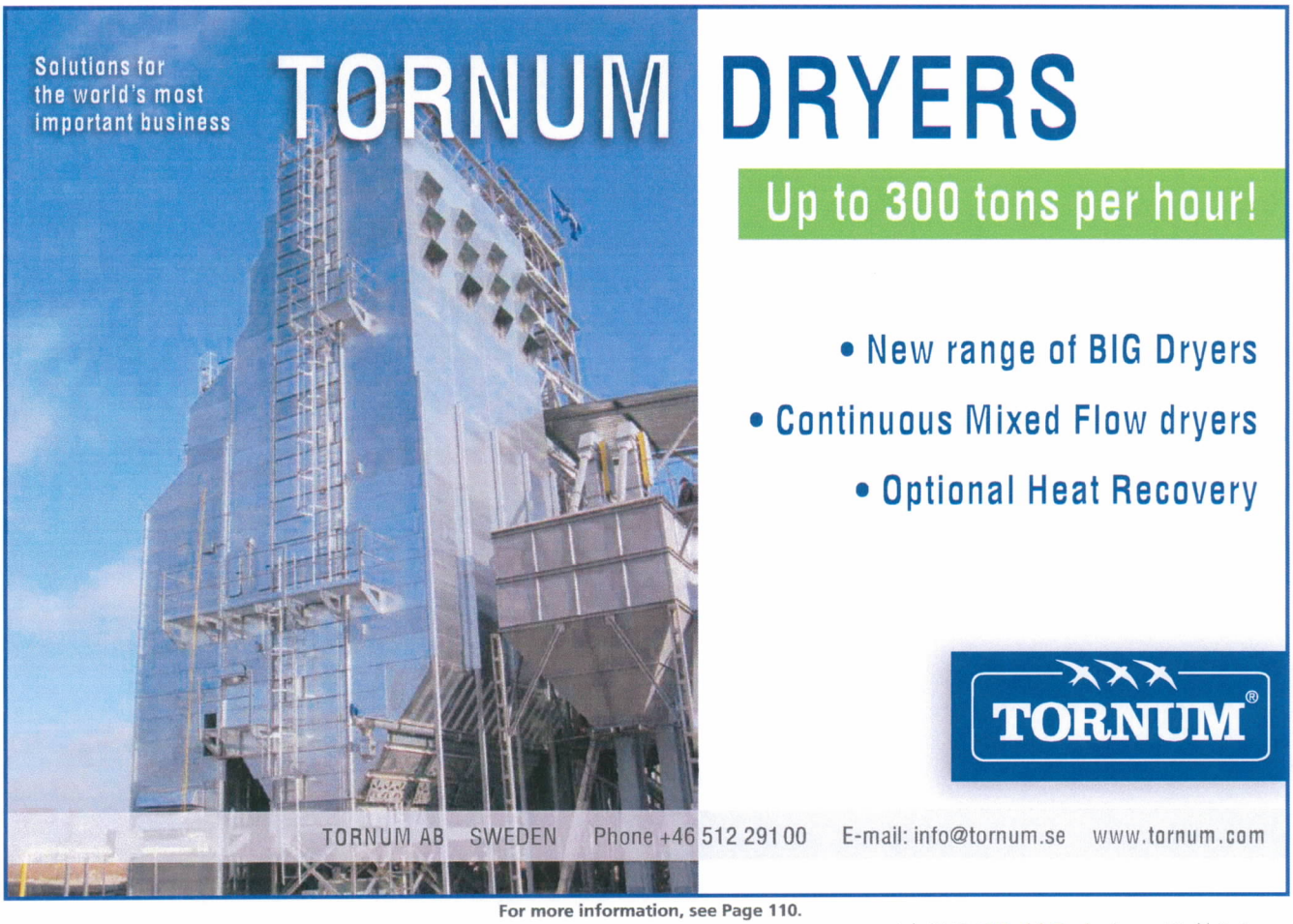

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