October 10, 2014 ***News Release***

DON: Keeping a Mycotoxin in Check Through Ongoing Research, Sound Sampling & Producer Awareness

Along with potentially lowering crop test weights and yields, the presence of Fusarium Head Blight (scab) in wheat or barley fields can simultaneously lead to development of a mycotoxin called deoxynivalenol (DON) in those grains. Depending upon the level of DON (also known as "vomitoxin") in it, a load of grain may be discounted – possibly even rejected – at the local elevator or other delivery point.

Why the concern about DON? Dr. James Pestka, Michigan State University distinguished professor of food sciences and human nutrition, says his research and that of others has shown that DON and other related toxins can impair growth and cause nausea and vomiting in animals — and, potentially, in humans. "We have found that DON mediates these effects by targeting both gut and immune function," Pestka relates.

Typically, grain with DON would need to be ingested at very high amounts to pose a health risk to humans; however, even at lower levels it can affect flavors in foods and processing performance (such as a "gushing" effect during beer brewing). The U.S. Food & Drug Administration has established advisory levels for DON, as follows:

• 1 part per million (ppm) on finished wheat products, such as flour, bran and germ, that potentially may be consumed by humans. (FDA does not state an advisory level for wheat intended for milling, since normal manufacturing practices and additional technology available to millers can substantially reduce DON levels in the finished wheat product from those found in the original raw wheat.)

• 10 ppm DON on grains and grain byproducts (88% dry matter basis) and 30 ppm in distillers grains and brewers grains (88% dry matter basis) destined for ruminating beef and feedlot cattle older than four months as well as for ruminating

dairy cattle older than four months. (FDA additionally recommends that DON levels in the *total rations of* these animals not exceed 10 ppm and 5 ppm, respectively.)

• 10 ppm DON on grains and grain byproducts for chickens (with the added recommendation that these ingredients not exceed 50% of the total diet).

• 5 ppm DON on grains and grain byproducts destined for swine (with the added recommendation that these ingredients not exceed 20% of total diet).

• 5 ppm DON on grains and grain byproducts destined for all other animals (with the added recommendation that these ingredients not exceed 40% of total diet).

The U.S. grain industry still uses a 2-ppm maximum DON level for raw grain, Pestka notes, based on previous experience with DON reduction cleaning and milling. The European Union has set complex, stricter standards, such as 0.2 ppm for infant food, 0.5 ppm for bread and 0.75 ppm for cereals and flour meant for human consumption.

"The FDA advisory levels are based on many years of animal research and limited observational data from human food poisoning outbreaks," Pestka observes. "If we stay within these guidelines, there should be little risk of DON to humans or animals."

Still, FHB-infected grains are of concern under certain scenarios, the Michigan State researcher notes. For example, there's the potential for certain demographic groups — such as the elderly, infants or vegetarians — to be at higher risk to DON exposure. Also, other DON congeners (compounds with similar structures) may also be present in grain along with DON. Then too, the existence of concentrated hot spots of fungus and DON can be — and sometimes is — missed due to inadequate sampling.

Dr. Paul Schwarz, professor of malting barley quality at North Dakota State University, says adequate analytical tools do exist for quick and reliable identification of DON-contaminated grains. The key, he emphasizes, is to obtain good samples. "We know that Fusarium and DON are not uniformly distributed on the head/spike in the field and perhaps not in the truck or railcar," Schwarz states.

"A good representative sample is key to accurate results, so proper sampling protocols need to be followed."

There currently are four DON-testing laboratories in the United States, with all four partially funded by the U.S. Wheat & Barley Scab Initiative. Two (one mainly for wheat, the other for barley) are located at North Dakota State University in Fargo; another is at the University of Minnesota in St. Paul; and the fourth is located at Virginia Tech University in Blacksburg, Va. Each of these labs tests anywhere from 10,000 up to 30,000 samples per year for DON.

Food safety and toxicology scientists continue research on DON in order to ensure continued consumer safety when it comes to this mycotoxin. Michigan State's Pestka sees four research areas as having particular priority at present: (1) Understanding the potency of DON congeners and metabolites. (2) Measuring the occurrence of DON and its congeners/metabolites in random samples in cereal grains and finished foods over the long term. (3) Determining whether and why some human populations are at greater risk to DON and its related analogs. (4) Becoming more aware of — and educating — smaller-scale growers, millers and maltsters of wheat and barley in the locavore (locally produced foods) movement who (a) may be growing susceptible varieties in non-traditional regions and (b) might be unfamiliar with FHB and DON issues.

NDSU's Schwarz strongly concurs with that last point when it comes to barley, noting that numerous local samples from Pennsylvania, New York and Massachusetts last year had DON and sprouting. Craft malt industry barley growers from that region — and also from other states, like Michigan — have variable experience, Schwarz observes. "Some are experienced producers, but some are relatively new to small grains," he says. "It really points out the importance of education and the involvement of local Extension with the locavore movement." Some of these producers have 'binned' barley that was too wet, he adds, which quickly damages germination and also raises the threat of storage molds and the production of other mycotoxins.

October 10, 2014

News Release

All wheat and barley producers play a key role in minimizing DON by in turn minimizing FHB/scab incidence and severity in their fields. While environment typically is a major influence in FHB occurrence, growers can use an integrated management approach — including the planting of crop varieties with FHB resistance and the application of effective fungicides on a timely basis — to help keep this disease, and its resulting mycotoxin, at bay.

###

For more information, please contact: *Sue Canty, Manager*
U.S. Wheat & Barley Scab Initiative
Networking & Facilitation Office
Phone: 517-355-0271, Ext. 1183
Email: scabusa@scabusa.org