Industry Needs for Early Warning and Integrated Management Systems for Harmful Mycotoxins

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A little about Kellogg

- Kellogg Company is a $13B food company headquartered in Battle Creek, Michigan
- Brands include Kellogg's®, Keebler®, Pop-Tarts®, Eggo®, Cheez-It®, Club®, Nutri-Grain®, Rice Krispies®, All-Bran®, Special K®, Mini-Wheats®, Chips Deluxe®, Sandies®, Morningstar Farms®, Famous Amos® and Kashi®
- Kellogg products are manufactured in 18 countries and marketed in more than 180 countries around the world
A little about me

• MS and PhD in Cereal Chemistry from Kansas State University
• Bachelors in Music Therapy
• Worked for Kellogg for 14 years
• Lead the Wheat Technical programs
• Leading the AACC International Annual Program Team
What I will share

• Why Kellogg cares about mycotoxins
• 5 case studies at Kellogg on the impact of mycotoxins on our business – 1996, 2008, 2000, and 2010
• Why management is important
• Why early warning is critical
Why does Kellogg care?

Made from Soft White Wheat or SWW Bran

Global number one brand
Case 1: 1996

- Massive outbreak of *Fusarium* head blight in soft white wheat (SWW) in Michigan, Southern Ontario, and New York
- SWW crop is specific to the ready-to-eat cereal business – used by Kellogg, General Mills, Kraft, and Ralston (whole grain and bran)
- DON concentrated in the bran
- No early warning systems in place
- New test for DON not widely available
SWW growing areas
Business implications

• Cost of transportation increased by millions of dollars (in 1996 it was $5MM)
• SWW from PNW is different quality because it is bred for noodle export and not for RTEC
• Because it is harder and drier, increased cooking time and input energy
• Plant through-put was reduced
What would have helped?

- Early warning! We had no early warning of the depth and severity of the FHB outbreak
- Eastern Soft White Wheat varieties resistant to FHB
- Better understanding by growers about causes of FHB and agronomic management systems
- Quicker DON tests to allow for better segregation of infected wheat from clean wheat
- Other ways to clean the wheat
What has happened since then?

- US Scab Initiative funded
- Agronomic practices have improved (most growers not planting wheat on corn stubble)
- Eastern Soft White Wheat Endowment established (MSU wheat breeder)
- Use of anti-fungals allowed more frequently
- Better DON forecasting and testing
- New milling methods practiced
One critical thing

• We had to get knowledgeable on FHB as a technical community within Kellogg
• This allowed us to make investments in the right areas to manage the FHB outbreaks and to reduce impact
Case 2: 2008-2009

- Wet growing season in the UK
- Event of *Fusarium* in UK with high levels of DON and ZON (zearalenone)
- New legal limits and new testing methods for ZON
- ZON and DON concentrated in the bran
Business implications

• Wheat bran from UK did not meet internal quality standards for ZON

• Bran had to be imported from Germany or USA to UK for production

• Increased the cost of the bran and its carbon footprint

• Shortened the shelf life of the raw material thereby increasing the complexity of supply chain
Added complexity

• In 2009, it was announced that wheat growers and millers in the US, Canada and Australia were supportive of GM wheat

• If we have GM wheat in the US, then the bran would be impossible to export to EU making the supply chain even more untenable

• Also, due to variations in local regulations regarding acceptable mycotoxin levels, country of origin might become extremely important for grain
Case 3: 2000

- Drought stress coupled with high moistures at harvest time
- Weather conditions led to outbreak of fumonisin in corn
Business implications

• Required removal of corn bran from All-Bran Buds
• This meant replacement of fiber source with a much more expensive source
• This had significant impact on the profitability of this brand
• If a brand isn’t profitable, then it will get culled
What has happened since then?

- Control of outbreaks has increased
- Possible that we can return to the use of corn bran in the product
Case 4: 2010

• Weather conditions in Ohio lead to significant outbreak of *Fusarium*

• Large amounts of SRW are grown in Ohio

• Significant impact on supply of SRW because many large mills in the eastern US blend Ohio wheat with local wheat
Business implications

• We have many bakeries in the eastern half of the US
• Nearly all of these bakeries have Ohio-based wheat as some portion of their flour
• Many bakery products (crackers and cookies) are relatively in-elastic in their pricing so a rise in flour has significant impact on profitability
Case 5: 2010

- USDA has reported for the first time that several strains of *Aspergillus niger* are capable of infecting corn as endophytes
- The researchers also showed that, under laboratory conditions, these species produced mycotoxins
- No rapid tests for ochratoxins
- Difficult for us to put on a COA if we can’t test for it
Business implications

• Unknown at this time
• Important for EU
• Again rapid testing is critical
Hot new case: 2010

• Early testing of some western barley has revealed ergot. (causal agent: *Claviceps*)

• It is clear that now that testing methods have improved, we will see more cases of mycotoxins in the food system
Why is management critical?

- Food safety is of utmost importance to the food industry and to Kellogg
- We rely on safe food ingredients for our business and for our consumers
- Increasing use of whole grains and brans (where many mycotoxins are concentrated) makes management critical
- Building safe management of food ingredients into our systems gives us the assurance that our foods are safe
- Management allows us to adequately test for safety of raw materials
Why is early warning important?

- Current grain supplies have been very short in the last few growing seasons. If we have a poor crop year followed by a mycotoxin outbreak, we have less flexibility of supply and sometimes no available grain.

- Shipping of wheat or corn long distances requires coordination and time – 2-4 weeks by train.

- Quality/Cost of the grain have to be assessed prior to arrival to assure seamless transitions in a plant.
Why is early warning important?

• Consumers expect safe food – our systems require time to manage change – therefore early warning is critical

• Because of current Federal law regarding country of origin labeling, we need early warning if we need to import wheat
Questions?

• Thank you all very much for inviting me.
• Some of my co-workers who contributed to this presentation include: Lori Wilson, Helbert Almeida, Herman Wenzler and Mark Moorman