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?

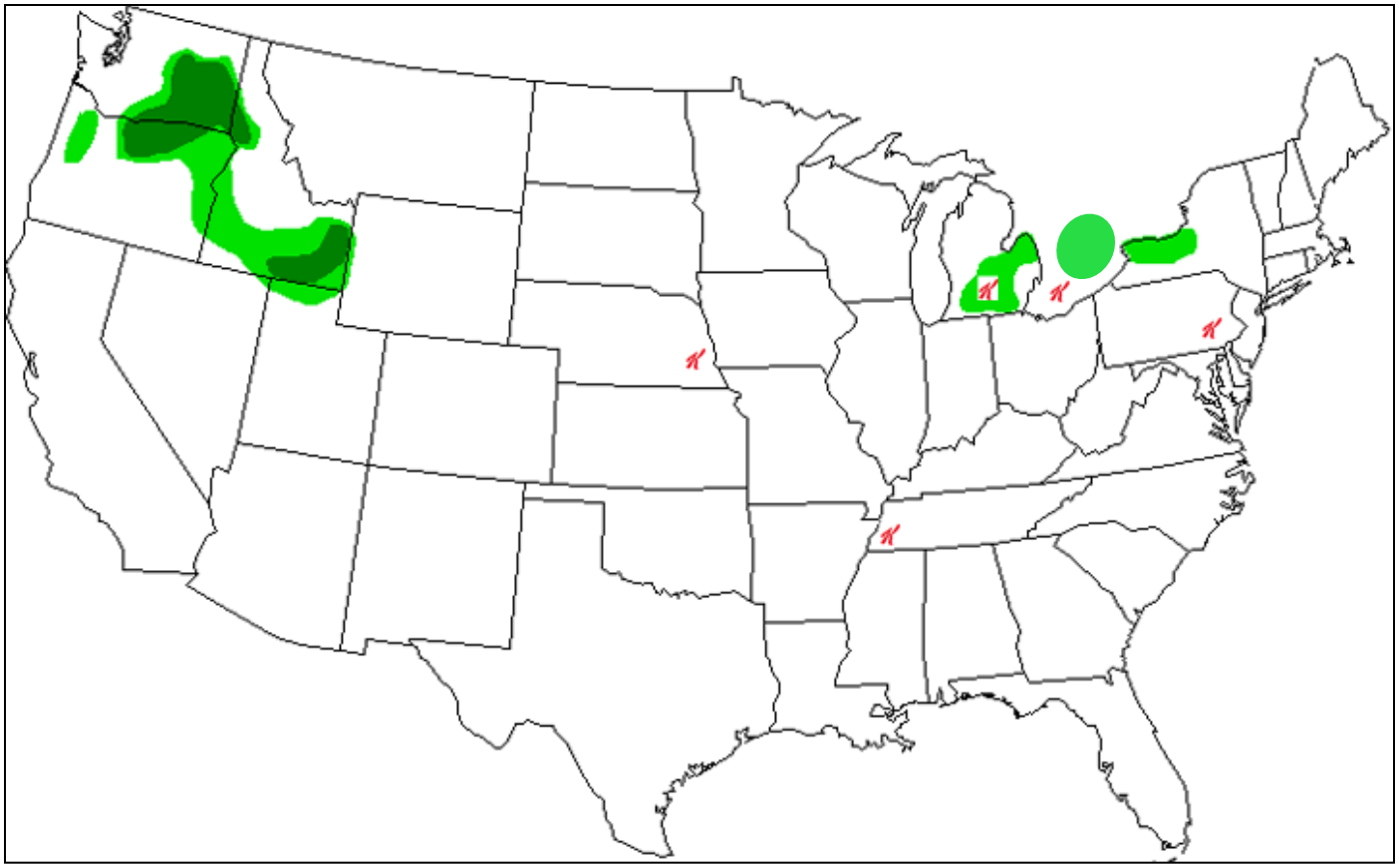
Made from Soft White Wheat or SWW Bran

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

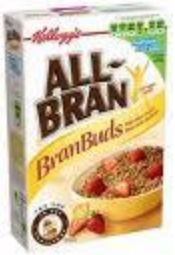
Added complexity

- 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: *Clavicepts*)
- 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