Managing Aflatoxin to Comply with Texas Regulations

Tim Herrman, Ph.D.
Professor, Soil and Crop Sciences
State Chemist and Director, OTSC
Texas A&M University
Managing aflatoxin to comply with Texas regulations

- Office of the Texas State Chemist
  - Laws
  - Rules
  - Policy
- Advisory Committee
- Best Management Practices
- Field, Lab, and Regulatory Procedures
- OTSC Plan of Work
Texas *laws* regulating aflatoxin

- Texas Commercial Feed Control Act
  - Texas Agriculture Code, Chapter 141

141.002 Commercial Feed

(c) The following are not commercial feeds subject to this Chapter:

(2) Whole grain or whole seed not containing toxins or chemical adulterants;
Texas laws regulating aflatoxin

- *Texas Commercial Feed Control Act*
  Texas Agriculture Code, Chapter 141

141.148 Distribution of Adulterated Feed

(a) A person commits an offense if the person distributes, conspires to distribute, or causes another person to distribute commercial feed:

(2) that is moldy, sour, heated, or otherwise damaged, because of which it is injurious to animals;

(6) that contains or bears a poisonous or deleterious substance that may render it injurious to animals under ordinary conditions of use

(b) An offense under this section is a Class C misdemeanor…
Texas rules regulating aflatoxin

- Texas Administrative Code
  Title 4. Agriculture Chapter 61
  Subchapter H. Adulterants
  61.61 Poisonous or Deleterious Substances
  (a) Poisonous or deleterious substances include, but are not limited to the following:
  (6) Aflatoxin B1, B2, G1, G2 above 20 ppb individually or total except that with proper labeling as approved by the Service <50 ppb may be distributed when destined for wildlife: <100 ppb may be distributed when destined for breeding cattle and breeding goats not used in production of milk for human consumption, breeding swine, mature poultry, and sheep; <200 ppb may be distributed when destined for finishing swine (more that 100 lbs. body weight); <300 ppb may be distributed when destined for feedlot cattle;
Office of the Texas State Chemist aflatoxin *policies*

- Feed Industry Memorandum 5-12
  To provide instructions on how to implement the law (Chapter 141 of the Texas Agriculture Code) and rule (Chapter 61 of the Texas Administrative Code) including labeling, blending, and record of disposition regarding aflatoxin-containing whole grain and oilseed introduced into Texas commercial channels for feed purposes.
2. As Blended Corn

A facility may distribute unprocessed whole corn originally containing no more than 500 ppb aflatoxin after blending it with similar corn containing no less than 20 ppb aflatoxin so that the final blended product contains no more than 200 ppb aflatoxin. **Blended corn may only be shipped to finishing cattle in confinement even if the final blend tests less than 20 ppb aflatoxin.** A typical label is shown in Appendix III.
4. The same ingredients containing >500 ppb may not enter commerce for use in animal feed. A record of disposition of these grains and oilseeds shall be kept by the licensee to document that said commercial feed ingredients are not used in the manufacture of animal feed. This policy applies to insurance companies providing a financial settlement on crop insurance with a farmer, the latter of whom are exempt from the Feed Control Act (§141.002(c)(4))
OTSC Advisory Committee

- **Representation**
  - 4 feed consumers
  - 4 feed manufacturers/distributors
  - 4 fertilizer consumers
  - 4 fertilizer manufacturers/distributors

- **Mandate**
  - review and provide recommendations on internal and external issues relating to structure, operations, policies, plans and long range goals of the Office of the Texas State Chemist and its divisions: Feed and Fertilizer Control Service, Agricultural Analytical Services and Resource Management
OTSC Advisory Committee

- OTSC Advisory Committee on 11/30/05 advocated development of best management practices to manage mycotoxins for the feed and grain industry. OTSC will work to ensure everyone reports the correct tonnage and focus our monitoring of those companies that currently are not testing, labeling, record keeping, and reporting for mycotoxins.
Mycotoxin BMPs

BEST MANAGEMENT PRACTICES TO
Prevent or Reduce Mycotoxin Contamination in Texas

MANAGEMENT PRACTICES
- Preharvest
- Postharvest
- Regulations
- Maps
- Presentations
- Links

Delivery
- Sampling
- Testing
- Placement
- Bin Preparation
Post Harvest BMPs

- Collect a 10 pound sample from incoming grain
- Grind the entire grain sample using a Romer or Viking mill before sample reduction
- Reduce sample using a riffler to retain representative property of the sample
- Fine grind proportion for analysis to pass through a 20 mesh sieve
- Use testing methods approved by either USDA or AOACI
Post Harvest BMPs

- Use a reference sample obtained from OTSC
- Store grain over the action level separately
- Test incoming unit trains
- Test incoming grain from farm storage
- Do not commingle grain exceeding the action level with grain below the action level during reclaim
- Correctly label grain exceeding the action level
OTSC Field Procedures: SAMPLING

Samples must be obtained by a procedure which yields a representative sample using procedures of AOAC International or procedures that are determined dependable through research and/or investigation. Refer to Section 965.16 of the 15th Edition of AOAC “Sampling of Animal Feed – Procedure.”
Sampling while loading or unloading

- Railcars, hopper bottom trucks, straight trucks and trailers. Use a stream cutter. Minimum of 10 cuts at equal intervals to provide approximately 20 lbs.
Probe sampling of bulk containers

- Railcars, hopper bottom trucks, straight trucks and trailers that are open-topped. 10 probes.
- Limited-access vehicles, with one compartment. 10 probes.
- For vehicles with multiple compartments. Minimum of 10 probes.
- Collect and retain a sample size of about 20 lbs.
Open topped, loaded, stationary rail cars, hopper bottom trucks, straight trucks and trailers
Use of Stream Sampling Cup

DIRECTION OF SAMPLE CUP MOVEMENT
Chain of custody from field to lab
Aflatoxin Analysis in Corn:

- AOAC 977.16 - Sampling for Aflatoxins (Preparation for Sample Procedure)

- AOAC 991.31 - Aflatoxins in Corn, Raw Peanuts, and Peanut Butter (Immunoaffinity Column Aflatest Method and HPLC)
Sampling and Sample Preparation

- 20 pound sample collected
- Entire sample ground and subdivided by Romer Mill
- 5 pound portion further ground by Retsch Mill with 1.5 mm screen
- Sample passes through a number 20 sieve
Sample Grinding
Sample Grinding
Screen Analysis (Vicam Aflatest)

- 50 grams extracted with 70% methanol
- Extract filtered, diluted and applied to affinity column
- Aflatoxins isolated, purified, and concentrated on column
- Aflatoxins removed from column by methanol
- Aflatoxins quantitated by fluorescence after reaction with bromine solution
- Samples over 15 ppb subject to HPLC analysis
Confirmation Analysis (HPLC)

- 50 grams extracted with 70 % methanol
- Aflatoxins cleaned, concentrated, and eluted through Vicam Aflatest column
- Aflatoxins quantitated by PHRED (Photochemical Reactor for Enhanced Detection) fluorescence after separation on high performance liquid chromatography
Aflatoxin Analyses
OTSC Plan of Work

- Surveillance sampling (800 in FY 2006 and 1600 in FY 2007)
- Report OTSC results to trade associations
- Follow up on all milk dumping cases
- New measurement methodology (HPLC)
- Grain elevator census by visiting all facilities (250 commercial warehouses) in top 40 corn producing counties in 2005
OTSC Plan of Work

- Develop and encourage adoption of BMPs
- Close gaps in compliance
  - Work with FDA and Mexican officials on corn over 500 ppb
  - Work with Risk Management Agency on ensuring destruction of corn over 500 ppb and channeling grain containing aflatoxin between 301 to 500 ppb to licensed facilities with blending plans
- Update OTSC rules to align with FDA guidelines and OTSC policy
- Approve sequestering agents for feed
Summary

- OTSC is the designated state agency that provides regulatory oversight for mycotoxins in grain in Texas.
- Practices adopted by the Office reflect input by stakeholders, the OTSC advisory committee, public hearings and they are science-based.
- OTSC works closely with state and federal agencies in the U.S. and Mexico to manage the risk and problems posed by aflatoxin.