



## Nationwide Pet Food Outbreak: The Laboratory Story July 23, 2007

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## Pet Food Outbreak: The Beginning

- March 15, 2007
  - FDA learns of pet foods associated with cat and dog deaths and illnesses
  - Suspected contaminants: pet food protein ingredients from China
  - Comprehensive testing of raw materials and finished products
    - FDA labs
    - State labs
    - Firms' labs
    - Contract labs



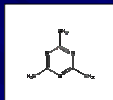
## Laboratory Challenges

- What to test for?
  - Ethylene Glycol and Diethylene Glycol
  - Ochratoxin
  - Mycotoxins (Aflatoxins and Vomitoxin)
  - Toxic Elements (Lead, Arsenic, Mercury, Cadmium, Zinc...)
  - Vitamin D
  - Potassium
  - Strychnine
  - Aristocholic Acid
  - Thousands of organic chemical contaminants (toxin screen)
  - Aminopterin
- Multiple matrices
- Lack of validated methods

## Initial Findings

- FDA launches an investigation within 24 hours after Menu Foods Inc. recalls products implicated in cat & dog deaths
- Consumer Complaints: Hundreds of calls per day
- March 21: FDA Sample testing begins
  - Forensic Chemistry Center (FCC)
  - Kansas City Lab (KAN)
  - New York Lab (NRL)
- March 22: FCC & manufacturer's lab find melamine in pet food samples
  - Apparent high levels: PPT (thousands) range
- March 23: FCC finds wheat gluten samples positive for melamine

## What does it mean?



- Melamine:
  - Precursor in the production of resins (used in plastics)
  - Used as a fertilizer & industrial chemical outside of US
  - High Nitrogen content
  - Apparent low toxicity (animals and humans)
- Quantitative melamine findings:
  - Ranged from 0.2% - 7.8% in gluten ingredients
  - Clear association with animal deaths
  - Reason for toxicity still unknown

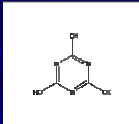
## Expanding the Testing

- FCC and FDA Pacific Regional Lab NW (Seattle)
  - Method Improvement
  - Method Validation
- Other Labs
  - Total 7 FDA labs gearing up
  - Worldwide: Method dissemination through CVM (Center for Veterinary Medicine) website

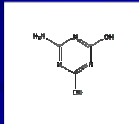
## Initial Melamine Findings

- **March 23:** FCC visually observed unexpected crystals in wheat gluten samples; found them to consist of melamine
- Also detected: melamine analogs

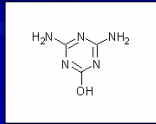
Cyanuric acid



Ammelide







Ammeline



**Snapshots of FDA's Lab Investigation**

- Microscopic Examination of wheat gluten
- Melamine Crystal removed from contaminated wheat gluten
- Wheat gluten samples in lab
- GC/MSD to test for melamine



## Solving the Mystery

- **Laboratory Observation (FCC)**
  - Melamine and cyanuric acid, in combination, insoluble in virtually every solvent
- **Toxicological Observation (CVM)**
  - Cat kidney crystals contain melamine & cyanuric acid
- **The implication: Crystallization is causing renal damage**

## The Pressure Mounts

- Huge sample testing backlog
- Congressional, press, and public Interest
- Methodology still evolving
  - Recovery issues
  - Matrix issues

## Refocused Analysis

- Products retested: cyanuric acid, ammelide, and ammeline often found in samples
- Directed refocus of testing
  - Melamine and analogs only
  - Suspend testing for other analytes

## A Huge Undertaking

- In a 2-month period, FDA laboratories analyzed a total of > 1,500 samples of finished products and raw materials
  - 583 of the samples were found positive for melamine and analogs
  - Hundreds of consumer complaint samples were collected by investigators for shipment to labs
  - ~450 lots of wheat gluten were found positive for melamine
- **Largest FDA emergency response in history!**

## The Apparent Motive

Why would wheat gluten be adulterated with melamine?

- FCC analyzes melamine-contaminated "wheat gluten" samples for starch
- 14 of the contaminated "wheat gluten" products contain 31-42% starch
- Expected starch content of wheat gluten: 5 - 8%
- Melamine elevates nitrogen level: wheat flour adulterated with melamine/analogs in order to appear like wheat gluten

## FERN Activation

- **April 5:** FERN is activated by the FDA and USDA to perform analyses on pet food, utilizing FERN-approved methods.
- FERN Activation includes the following measures:
  1. Notification of FERN staff. Regional Coordination Center (RCC) & National Program Office calls begin 4/6
  2. Approval of emergency FERN methods and posting of those methods in eLEXNET
  3. Notification of FERN Chemistry Cooperative Agreement Labs
  4. Protein Surveillance Assignment (PSA) issued to FERN Chemistry CAP Labs

## FERN Laboratory Response

- The 8 FERN Chemistry Cooperative Agreement Program labs participate in a FDA protein surveillance assignment
  - Target: analysis of 150 samples/week
  - Assigned products for PSA:
    - Corn gluten
    - Wheat gluten
    - Rice protein concentrate
    - Soy protein concentrate
- Coverage includes Domestic and Import:
  - Product examinations
  - Sample collections and analyses

## Implications: Human Food Supply?

- Melamine/analogs are traced to several lots of feed for animals bred for human consumption, including hogs and aquaculture fish
- Toxicologists consider melamine level <50ppm to be low risk to humans
- Tissue Method Development Working Group convenes
- As a precaution, affected hogs and fish are removed from food supply

## Lessons Learned

- Analytical methods can evolve simultaneously with product testing
- Ways to improve communication and coordination among FERN NPO, RCCs, DFS, and CAP & state laboratories
- Large-scale incident management in cooperation with FDA Office of Emergency Operations, CVM and other agencies
- FDA field lab and HQ personnel are willing to exceed the achievable and put in extra effort to protect health & safety

## Thank you!

- **For information, contact:**  
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- **Or visit coverage on FDA Website:**  
<http://www.fda.gov/oc/opacom/hottopics/petfood.html>

