

Animal Health Diagnostic Laboratory



Michigan State University

# **Emerging Issues on Chemical and Drug Residues in Meat**

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COMPLETION  
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# INTRODUCTION

- Definition
- History in Michigan
- Old issues
- Current Issues
- Effects of Chemical Residues
- Opportunities

# Introduction

- **Parent or metabolite that may accumulate in tissues or edible products**
  - **Drugs**
  - **Feed additives**
  - **Environmental cpds**

# Introduction

- **May 1973 PBBs mislabeled as Magnesium oxide**
- **Firemaster Vs Nutrimaster**
- **750-2400 lb in Livestock feed**

# PBB Story

- Sept 1973 cl signs in cattle
- Unthrifty
- Decreased milk
- abscesses
- Hematomas
- Abnormal hooves
- April 1974 FDA id cpd as PBBs

# History

- 1.5M Chickens, 23K cattle, 5K swine/sheep
- 5M eggs, 34,000 lb dry milk, 18,000 lb cheese
- 2600 lb butter
- 1500 cases of canned evaporated milk
- 865 tons of feed
- 530 Michigan farms were quarantined
- 8 M of 9.1 M residents tested positive

# Old Issues

- **Drugs**

- **Pesticides**

- **Carbamates**

- **Chlorinated hydrocarbons**

- **Organophosphorous cps**

- **Pyrethrins**

# Old Issues

- **Environmental compounds**
  - **Arsenic**
  - **PCBs, PBBs**

# Recent Cases

- 1995 Warbex case in Nebraska
- 1997 Fonofos
- 1997 Boron case
- 1997 Arsenic case
- 1990-1998 Lead cases (190, 19 farms)

# Emerging Issues

- **The Belgian dioxin story**
  - **1999 chickens exposed unintentionally to dioxin contaminated fat**
  - **Contamination not discovered for months**

# Chemical Terrorism

- The CDC has id 150 chemicals
- Narrow list
  - Dioxins, dibenzofurans, and PCBs
  - Arsenic
  - Lead
  - Mercury
  - Pesticides, persistent and nonpersistent

# Chemicals of Concern

## Uranium

- Cyanogen chloride, hydrogen cyanide
- Saxitoxin
- T<sub>2</sub> mycotoxin

# Emerging Issues

## ■ Clenbuterol

- beta 2 agonist
- Bronchodilator
- France, Spain, Italy
- Liver or beef containing 0.16 ppm or greater

# Emerging Issues

- **Synthetic growth hormones**
  - **17 beta estradiol**
  - **testosterone**
  - **progesterone**
  - **Trenbolone acetate**
  - **Melengestrol acetate**
  - **Zearanol**

# Emerging Issues

## ■ Phytoestrogens

- Isoflavones eg genistein, formononetin,
- Coumestans eg coumesterol
  
- Physiological effects in humans eg breast cancer

# Health Effects

- Allergies
- Pharmacological effects
- Cancer
- Birth Defects

# Research Opportunities

- More toxicokinetics data on potential terrorism chemicals in food animals and poultry
- Rapid tests for potential terrorism chemicals
- More data on natural toxins in food animals

# Immediate Needs

- **Beef up the labs' infrastructure (LC-MS/MS; High resolution mass spectrometer)**
- **National repository of reference materials**
- **National database of confirmed poisoning cases (reporting system)**

# Conclusion

- Chemical terrorism
- Clenbuterol
- Growth hormones
- Phytoestrogens
- New pharmaceuticals and pesticides