Manure Pit Foaming
Flash Fires / Explosions
Building Destruction

2016 Research Update
Foam destruction

Review
Overall program goal

• Determine causation of foam
• Find testing protocol to predicting foam
• Risk factors involved

• Three state long-term project
  – Illinois, Iowa, Minnesota
Evaluation of Foam Production
Statistical analysis / Risk assessment

- Integrator
- Feedmill
- Farm site
- Barn within site
- Pumping frequency
- Diet information
- Surface condition
- Manure analysis
- Microbial community
• Foaming and non-foaming sites have distinct microbial communities

• Sequencing Data
Foaming and non-foaming sites have distinct microbial communities for each integrator

Sequencing Data
Higher fiber, methane production, and depth are associated with foaming samples.
Minnesota database

- Working with Illinois
- Finding the missing piece
- Sorting data and matching up
  - To fit Illinois / Iowa database
Minnesota database

- Key difference
- Multiple integrators

Use multiple feed mills
For multiples barns or sites

Integrator A ➔ Feedmill A ➔ Site A
Integrator B ➔ Feedmill B ➔ Site B
Enzymes for controlling foaming

- Lipase—-breaks up fats, oil, grease
- Lignin peroxidase—breaks up fiber

- No effect on foaming (A layer)
  - Strong foaming capacity
  - Peroxidase dose too small
Enzymes for controlling foaming

- Lipase—breaks up fats, oil, grease
- Proteinase—breaks up proteins

- Interface top manure (B layer)
  - Lipase increased foaming
    - Increased concentration long-chain fatty acids
  - Proteinase decreased foaming
    - Hydrolyzes (breakdowns) proteins
Manure composition

- Foam (A layer)
  - Higher long-chain fatty acid concentration
  - Higher protein concentration
- Interface (B layer)
  - Higher protein concentration
Barn types

- Foaming
- Non-foaming
- Transition
- Treated

- No difference within each layer
  - Long-chain fatty acids
  - Protein
- Large variability among samples
- Foaming materials concentrated in A-layer
Working with Iowa

- Analyze collected samples
  - Oil, LCFA, triglyceride, monoglyceride, glycolipids
  - Total bile acid
  - Fine solids size & concentration
  - Proteins
  - Hydrophobicity (surface energy)
  - Foaming capability
  - Foaming filamentous bacteria counts
The day Leon Sheets’ world went BOOM

Former IPPA president injured in hog barn fire

Manure pit foam is being partially blamed at a farm near New Hampton, Iowa.

Second- and third-degree burns covered 20 percent

“I was only power washing,” he explained.

“I was only washing. I wasn’t thinking of the consequences because my foam wasn’t bubbling through the pits. It was down – it was only a foot deep,” Sheets lamented. “It wasn’t a problem.”
New Horizon barn fire

- Nursery
- Two workers pressure washing
- No animals
- Two-foot of foam
- Blew out concrete block walls, fans
  - Explosion ??
  - Quick moving fire, burned within minutes
  - No time to escape
New Horizon barn fire

• Blew out concrete block walls, fans
  – Explosion ??
  – Quick moving fire, burned within minutes
  – No time to escape

• State Fire Marshal—heater

• Insurance Co—complacency
Monensin current status

• MPCA & Dept Ag “above board”
• Adding 2 – 4 lb after pumping & mix
  – Preventive
• Adding 5 lb per 100,000 gal of manure
  – Control after foam present
• Trend not to add
• Complacency
• Producers worried about other issues
Recommendations

• Check pits upon entry (weekly)
• Foam present
  – Treat
  – Pump manure
Recommendations

• Check pits
• Proper ventilation
• Emergency backup generation
• Never shut off
  – Even when empty
Recommendations

• Check pits
• Proper ventilation
• Emergency backup generation
• Never shut off
  – Even when empty
Recommendations

• Check pits weekly
• Proper ventilation
• Eliminate sparks
  – Cigarettes, cigars, pipes, etc.
  – Sparking switches / motors
  – Pilot lights
  – Welding / grinding
Recommendations

• Check pits weekly
• Proper ventilation
• Eliminate sparks
• Monesin addition
  – 2-4 lb right after pumping
let’s be careful out there

Stopping for Questions