Mono-Slope Beef Barn Field Day

Managing Mono-Slope Barns to Improve Cattle & Environmental Performance

Thursday, August 23, 2012
3:00 – 4:30 p.m.
Ron & Clayton Christensen's Barn
Royal, IA

This field day is part of the NW Iowa Regional ICA Meeting

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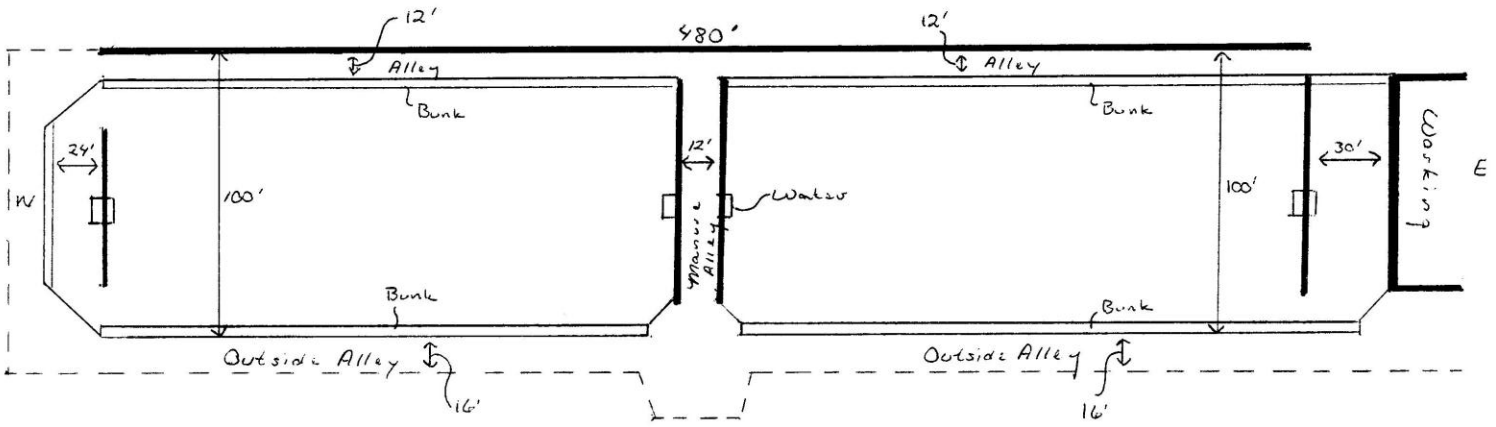
12'
480'
12'
Alley
Alley
Bunk
Bunk
24'
100'
12'
Water
Manure Alley
100'
30'
Working
E
W
Bunk
Bunk
Outside Alley
16'
Outside Alley
16'

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How We Manage the Barn

Ron & Clayton Christensen

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1. **Type of facility:** Wide mono-slope barn with solid cement floor

2. **Why we chose this type of facility:** We built the mono-slope barn in 2007.

   - Like concrete and steel for long term use and durability
   - Knew the air flow would be good all the time
   - Provides cattle comfort; seems the best environment to raise cattle
   - Ease of working cattle
   - Size of cattle lot – doesn't take up a lot of valuable farm ground
   - Manure handing is easier because of its consistency

3. **One-time feedlot capacity:** 999 head

4. **Cost per head space:** $623/head

5. **Kind and amount of bedding used:** Round cornstalk bales. Bed each pen with 4-6 bales twice a week (16-24 bales/week) on Monday and Friday. This depends on the size of the steers and number in the pens. It also depends on recent rain or snow. It takes one hour with two people working (2 hrs/week).

6. **Special management we have for:**

   a. **Feeding –** Feeding is done two times a day; 3 loads each day. The bunks are good because they prevent waste. When cattle are small, they can all get to the bunks. Also, less snow and rain gets to the bunks.

   b. **Manure handling –** We try to haul manure once a week, depending on the size of the cattle. The outside 12-16 feet of the pen is scraped. There usually are 8-12 loads per building per week. It take 5-6 hours, depending on the distance the manure is being hauled.

   c. **Animal handling –** Animal handling is easy with little stress on the cattle. They calm down very easily. We hand feed hay to get them comfortable with people. To remove sick cattle, gates open right to the sick pen. Cattle are sorted in alleyways. We have noticed, when sorting, that cattle stay at the perimeter of the pens and don't seem to like to walk on the bedpack then.

7. **Environmental regulations we have:** This is an open feedlot under DNR rules.

    - 1250 feet away from the other open lot
    - Stay under 1000 head
    - 10% of the lot is open and at any time, any steer could walk outside for feed & water
    - There is no discharge of waste into the environment

8. **If we were expanding our feedlot again, here is what we would change:**

    - Make more room to get into manure alley
    - Do not need as many lights
    - Would put the working facility in the same building
    - Do not need two doors in the end wall
    - Do not need outside pens
    - Open lot areas increase risk of run-off

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1. What was the environmental focus of this research?
The focus was to determine the emission rates of ammonia, hydrogen sulfide, particulate matter, carbon dioxide, methane, and nitrous oxide in beef deep-bedded monoslope facilities. Also, this project provides baseline information to evaluate differences in emission rates due to season, time of day, growth cycles of animals, and building management.

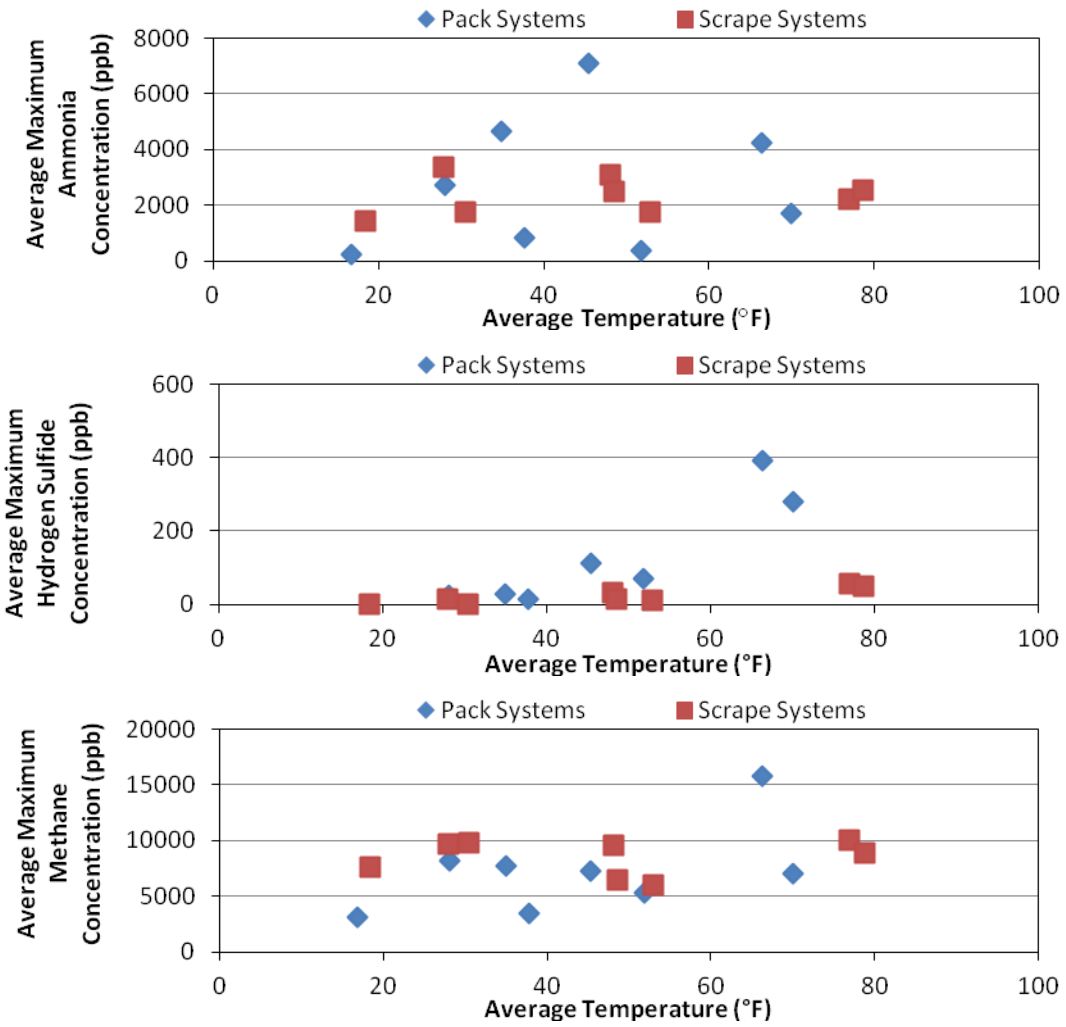
2. What are the major, current regulations regarding this water or air quality issue?
The federal air quality-related regulations that impact many animal feeding operations (AFOs) are the Clean Air Act (CAA) and the Emergency Planning and Community Right-to-Know Act (EPCRA). The CAA is a permit-type program. For livestock production, particulate matter is the pollutant of most concern. The emission limits vary depending on the overall air quality conditions of the region (air quality standards attainment status). The EPCRA requires producers of large CAFOs (more than 1000 head of cattle) that have the potential to emit more than 100 lb/d of ammonia or hydrogen sulfide to submit a report to local authorities. However, there is a lack of scientific data to help producers make good faith estimates regarding their operation's air emissions.

3. How was this research project funded?
This project was funded through a USDA Agricultural Food Research Initiative (AFRI) integrated grant awarded to South Dakota State University with Iowa State University and U.S. Meat Animal Research Center as collaborators.

4. What did this research involve (materials and/or methods)?
Four beef deep-bedded monoslope facilities were selected for monitoring. Each site is monitored continuously for one month each quarter for two years to capture both daily and seasonal variations. The SDSU instrument trailer alternates between two producer-owned sites in Eastern South Dakota. These two sites practice weekly manure removal. The ARS instrument trailer oversees two sites in Northwest Iowa. These two sites keep the majority of manure in the barn, along with bedding, and allow a bedpack to develop. The emission data require measurements of the airflow through the barn, and the pollutant concentrations entering and leaving the barn. At each facility, the environment-controlled instrument trailer and associated equipment is located adjacent to the barn. The trailer contains: a gas sampling system (GSS) that consists of Teflon tube sample lines connected to a computer controlled sampling manifold, gas analyzers, computer, data acquisition system, calibration gas cylinders, and other supplies. In addition to the sampling lines, there are environmental instruments to measure the airflow and weather conditions for two pens in each barn.

5. What were the important conclusions of this research?

Based on currently available data, there are indications of differences between pack and scrape manure management systems, as well as temperature, for ammonia and hydrogen sulfide concentrations. Methane concentrations are more consistent between systems and for different temperature conditions. Emission values will incorporate these concentration data, in conjunction with airflow data, which also varies between sites and temperature conditions.



6. What was the public value of this research (how might the general public be affected)?

This project expands the knowledge base of gaseous emissions from deep-bedded beef barns, provides management tools to improve the confidence of stake-holders and producers that they are practicing techniques for minimum emissions, and enables producers to effectively manage their production facilities for minimal gaseous emissions, thus benefiting the surrounding community.