Mitigating Air Emissions From Animal Feeding Operations Conference

Iowa State University

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Dairy Production Systems
Oregon State University

TODAY:

1) Challenges to dairy systems.

2) Finding the balance.

3) Learning from European efforts.

Additional Dairy Studies….

Dr. Chase, Cornell University

"Methane Emissions from Dairy Cattle"

Dairy attributed to 25 % of enteric methane which is 21% of total US methane emissions, 2005.

Mitigation objectives is to continue to improve efficiency of both animal productivity and ruminal fermentation.

Genetics, feed quality, ration formulation and dairy nutrition management are animal factors identified.

Ration formulation

- **High forage diets – increase methane**
- **low quality forage diets – increase methane**

Implication for Oregon

- **– pasture, grass based systems**

Implication for all ruminants

- **– escalating costs of grain, risk of by-products feeds affecting ammonia, hydrogen sulfides, or phosphorous balance.**

Additional Dairy Studies….

Dr. Ndegwa, Washington State University

"A Review of Ammonia Emissions Mitigation Techniques for Concentrated Animal Feeding Operations"

Diet, facility design, manure treatment to abate volatilization of ammonia

First line of defense…optimizing diets for N utilization

Post-excretion manure management …potential opportunities with positive and negative attributes (acidification).

Additional Dairy Studies….

Dr. Mukhtar, Texas A&M University

Reviewed the seasonality and variability of sources of ammonia emissions on two different dairy systems.

Open-lot dairy of 2000 head
~ 100 measurements each 95% confidence interval
Summer: 4.5 to 18.7 kg NH3/year/head
Winter: 2.5 to 9.9 kg NH3/year/head)

Within a given farm, measures were highly variable.

Netherlands Approach….

Dr. Ogink, Wageningen University

Green Label measurement protocol (similar to NAEMS):
Ammonia emissions and mitigation strategies
To assign emission factors to housing systems

Between farm variation
Within farm variation
Both varied in the range 30-40% (relative stand. deviations)

Thus, multi-site sampling approach
min. 4 farms, 6 periods of 24-h sampling, over a year

Implications ….

Nutritional programs of dairies

High forage diets (pasture), or low quality
increase methane
Balance dietary protein
reduce ammonia

Determination of Emission Factors and Mitigation Strategies

Limitations of control laboratory data
High variation within and among farms limits accuracy of measurements

NAEMS: Livestock farms emit PM and VOC in excess of CAA thresholds, or NH3 and H2S in excess of CERCLA and EPCRA reporting requirements

Implications ….

NAEMS: Livestock farms emit PM and VOC in excess of CAA thresholds, or NH3 and H2S in excess of CERCLA and EPCRA reporting requirements

Netherlands have alter their approach:

From continuous sampling single farm
to multiple site, target sampling periods

Current measurements in the US will only be the first step in understanding air missions from livestock operations and potential mitigation strategies.

Additional Dairy Studies….

Dr. Mitloehner, UC-Davis

Three papers were presented utilizing the chamber system and measuring equipment.

Many questions arose related to the methods and design of the chambers:

- **inlet and outlet location**
- **airflow measurements**