So agencies can better understand agriculture’s story, what changes have occurred in each industry’s history that may affect ammonia emissions?

- Stop compost activities
  - Turning
  - Watering compost
  - Loading/moving/screening
- Reduce or stop manure activities as much as possible during upslope events
- Cannot stop caring for animals.
  - Must keep cows clean and dry
  - Must provide bedding/housing, feed, water
- Reduce Flushing, manure handling
- Turn off evaporators or aerators
- Scrape some freestall alleys instead of flushing
- Composting procedures to reduce NH3 emissions
  - Less turning
  - More carbon added to manure
AGENCY QUESTIONS & DATA GAPS FOR COLORADO AGRICULTURE

Changes in Dairy

So agencies can better understand agriculture’s story, what changes have occurred in each industry’s history that may affect ammonia emissions?

- More milk/cow. Colorado ranks #1 in pounds of milk/cow (25,600#)
- Virtually all dairies test their feed and use a nutritionist to formulate precisely balanced rations for the various groups of cows on the farm.
  - Protein, energy and fiber are fed to maximize production, milk fat, milk protein, body condition, reproductive efficiency, and health and efficiency.
  - Feeding has gone from an art to a science.
    - Knowledge of the types of protein in various feeds and how to use them to maximize efficiency, combined with better understanding of the digestive process in cattle has reduced urea excreted and increased productivity.
- Rumen digestible protein (Degradable protein)=NH3
- Bypass protein (Undegradable protein)=no NH3
AGENCY QUESTIONS & DATA GAPS FOR COLORADO AGRICULTURE

Advances in Dairy
Monitoring MUNs helps inform the success of the feeding program. The state average for August-September is 10.30 mg/dl.
Genetic improvement has increased dramatically through the use of extensively proven bulls and more recently because of the mapping of the entire bovine genome.

- Farmers can select for production, health, longevity, and conformation traits
  - Use of genetic typing of both bulls and cows on the farm to make use of these traits
  - Embryo flushing and transfer on dairies has become more common-accelerates improvements

Emerging technologies

- Feed additives to increase feed efficiency-Yeast products, Zeolite, monensin,
- Real time rumen monitors
- Advances in plant genetics and breeding have resulted in more digestible varieties of alfalfa and corn.
- National Air Quality Site Assessment Tool (NAQSAT), computer modeling
What is an achievable goal (e.g., operation size, percentage) by industry for increasing participating “partner” producer numbers? Possibly achieving participating “partner” producer status for all large operations or significant producer percentage?

- Maintain or increase participation of the existing xxx dairies enrolled in the Early Warning System.
  - Number of cows in Colorado: 150,000
  - Number of cows in targeted areas: 139,400
  - Number cows participating in targeted areas: ###
How to achieve the industry goal from the previous question?

1. Compare the lists (CDPHE, NRCS) of dairy farms with those currently participating in the EWS.
2. Reach out to current participants and reinforce the importance of the EWS and their response to warnings and any actions taken.
3. Conduct face to face outreach to those who have not participated beginning with counties who are most affected.
What are “S.M.A.R.T” measure(s) for each industry?

- Measured by participation and BMP implementation.
  - BMPs to impact release of NH3
    - Reduced manure/compost handling
    - Cessation of effluent use: lagoon aeration, field application
    - Rapid incorporation of nutrients
  - BMPs to impact production of urea.
    - Dairies can monitor protein in diet and MUN in milk.
    - Use of nutritionist
    - Monitoring of feed intake vs production and cattle health
    - Testing of feed

- Monitoring and recording feed related illnesses; rumen health, testing just fresh animals for ketosis, watching for signs of ruminal acidosis and metabolic disease.
Q Request BMP implementation data record/history by industry. (Cumulative BMP list must be referenced.)

- Reference the EWS database to determine participation/implementation
  - Encourage partners to respond to questions on text or email
- NRCS data may be used as a secondary source of BMP implementation
  - Use of NRCS BMPs and models
Q What are the barriers to BMP adoption by industry? How to overcome and incentivize?

- Scientifically proven effectiveness
  - Data, research that quantify reductions from BMPs selected.
- Hard for partners to compromise animal well-being for environmental well-being
- No appetite for additional “regulation”, voluntary or otherwise
  - Most want to do the right thing
  - Often not possible to add expense or infrastructure to accommodate new technology needed to implement a new BMP.
Q What are the barriers to BMP adoption by industry? How to overcome and incentivize?

- **Man Power / Labor**
  - Often less labor needed when BMP involves NOT doing something.
  - May make it hard or impossible to catch up the next day if not enough labor then or other scheduled activities would overwhelm the farm.

- **Economics, science, education and outreach**
  - Understanding of the issue and process of how NH3 is formed.
  - May make picking and implementing BMPs easier.

- **Weather / Environment**
  - Severe weather may confound implementation.
  - Early Warning may not be early enough or actually force producers to pack as much into a day as possible.
Questions?