Clayton Room: Group Facilitator: Mike Cotta

Recorder: John Brooks Clayton
Reporter: Dorman Grace

High Impact Research, Education, and Tech Transfer Needs

1) Bowling Green comments
    a) Complaints about odor – dairy, swine, poultry
    b) Poultry unit operation in the vicinity – subdivision moves in and complaints on odor begin. General public complaint – ARS find a way to mitigate
2) Texas Ag Life Comments
    a) P mitigation
    b) Find a way to extract P and use as a fertilizer – mine nutrients or capture value
    c) Lagoons, retention control structures – need to find a way to determine structural integrity of concrete (or similar) lined lagoons
    d) What are the best trees for a specific area, for odor control dispersal, and visibility, air particulates – odor emission barriers
    e) Protect barns from dust/particulates accumulation, Algae, Calcium deposits
    f) More standardized way to collect and handle samples for various bacteriological parameters – to properly manage and determine who's to blame wildlife vs. CAFO
    g) Different types of P and movement and availability of species
    h) Recycling of flush water (algae causing slick hazardous conditions on concrete) from dairy and treat to reduce nuisance microbes but not harm lagoons and beneficial microbes
3) Texas Comments
    a) Ash production – do something with it (e.g. ash from burning)
    b) Analytical Methods – determine value of coproducts
    c) co-product value/consistency
    d) ID of alternative energy sources – use of some of these resources for energy
        a) New ways of doing "old processes" e.g. new bedding materials
4) Swine Alabama Comments
    a) Different manure application techniques, soil type variations which lead to different types of application methods
    b) Different application techniques for different terrain types.
    c) Economics of conversion of manure to energy – making it economically feasible to convert manure to energy so farms become self sufficient.
        a) Economically cost prohibitive for start up of manure to energy conversion
    d) Swine odors remaining stagnant during specific time periods – particularly summer – associated with weather/meteorological conditions of the season, is there a way to manage this
5) Poultry Alabama Comments
    a) Urban sprawl affects land application, hence odors a problem

a) sub-surface application
b) Find a way to truck it more efficiently by condensing
c) Extract nutrients to make more cost efficient or similar method
d) Digestors to burn the manure
e) Poultry houses – particulates clogging exhaust fans
a) Some kind of barrier to collect particulates (both swine and poultry)

6) Dissemination of Information - Extension Faculty/Units
a) Find a way to generate bulleted information sheets that target specific commodity to point to the literature and hence the scientist.
b) ARS annual reports need to target specific commodity
c) Local/regular communication to transfer science to producers, but a way to find out about non-local information.
d) Control and mitigation of undesirables in manure.
a) Pathogens
b) Nutrients
c) Pharmaceuticals
d) Antibiotics – Antimicrobials
e) Hormones
f) Bioremediation or Remediation of pharmaceuticals
a) cost-feasible, and environmentally friendly

7) Web-based information, communication tools
a) Public may not understand what is "quality" information and not
b) An ARS or similarly authored website that can be trusted – quality information can be obvious; "People believe what they want to believe"
c) ARS is really not known (BIG SECRET) – need a way to get recognition for contributions – Confused with university
d) By localizing our units – we (ARS) lose the big ARS brand name

MOST IMPORTANT ISSUES

1) Odors
2) Mitigation of undesirables…
3) Co-products
4) Different Land Application Technologies/Methodologies
5) Economics of everything
6) Validity of microbiological source tracking and sampling methodologies

Truman Room-- Group Facilitator: Matt Smith

Recorder: Thanh Dao
Reporter: Charles Eirkson

High Impact Research, Education, and Tech Transfer Needs

Priority	National Needs
2	BY-PRODUCTS
	More demonstration of industrial benign by-products that are produced in large quantities, including risk assessment (e.g., synthetic gypsum)
	Expand in new uses, i.e., gyp boards in different parts of the US (more soils, climate) where they make the most sense to use and get most benefits.
	Technology transfer to growers cost share as BMPs
	Quantify benefits
	Educate producers/growers of beneficial aspects of benign industrial (i.e., power plants) by-products (eg, in soil erosion control, run-off load reduction of phosphorus, sediments)
3	ENERGY:
	Energy recovery (Compost heat, distributed production)
	All scales of energy recovery: life cycle analysis, carbon footprint @ small-, farm-, to regional scales. Particular difficulties exist at the intermediate scale that may be involving consultant/third-party operators (Portability).
CROSS cutting issue	TECH TRANSFER/OUTREACH-
	E-Xtension, more web-based technology transfer efforts
1	PUBLIC & ENVIRONMENTAL HEALTH OF MANURE CONTAMINANTS
	Pharmaceutically-active compounds (endocrine disruptors, hormones, antimicrobials..,) in manure, risk assessment fate and transport, bioavailability information, BMPs to mitigate transport; risk management; source ID (agriculture vs. water treatment plants [PTOW]); tracking; treatment
	Odor/nuisance/public welfare (measurements, mitigation, pests,

	vectors, biosecurity issues, etc…)
CROSS cutting issue	NICHE MARKETS/NATURAL& ORGANIC
	Manure and byproducts as parts of organic farming
	Effects of conservation/farming practices on fate/transport of PAC Air quality mitigation
CROSS cutting issue	BENEFITS
	Economics Energy credits Life cycle analysis

Ladue Room—Facilitator: Andy Cole

Recorder: Bob Matteri
Reporter: Guy Hall

<u>High Impact Research, Education, and Tech Transfer Needs</u>

NP206 Components

1) Air Quality

- Greenhouse gases, climate change issues – production sites and land application sites
- Carbon credits (international) – will enhance economic sustainability
- Feed management and/or manure treatment to retain ammonia
- Gas emissions from compost bedding in dairies
- Pathogen drift (aerosol)

2) Nutrient Management

    - P management
    - Utilize DDGs
    - Reduce P, while maintaining (or enhancing/concentrating) N, in poultry for transport/use in crop production. Applies to general animal industries. Product needs to be valuable enough to transport.
    - Grazing systems near streams (surface and groundwater transport), waste disposal in drains

3) Pathogens and Pharmaceuticals

    - Pathogen/Pharmaceutical source, tracking, fate, transport
        i. Rational border areas
    - Endocrine disruptors
    - Arsenic and metals
    - Pharmaceutical Markers – Identify human vs animal ag source.
    - Antibiotics

4) By-Products (includes energy)

    - Poultry bedding (traditional wood shavings being used elsewhere)
    - Fractionate/separate valuable components for multiple uses.
    - Alternative uses for manure – By-products with value comparable to primary product.

ISSUES (NEXT 5 YEARS):

- Decision Tools (physical-based models) for manure management
- Applied "translational" research – Field studies (demo projects) needed. Relevant and economically feasible.
- Studies need to be of proper scale for regulatory agency usage, or model for extrapolation of smaller studies to large scale. Solutions need to be economically viable.
- Integrated Teams to produce Integrated Systems (Economically and Environmentally sustainable) and transfer the technology for practical application.
    - Ecosystems services. Lifecycle analyses. Tech tran/extension/education.
- "Speaker services" – experts that can talk to producer groups. Find the expert program. Experts need to be neutral and credible to all groups (producers, environmental groups, etc).
- Industries & Regulatory Agencies need input from the right scientific experts. ARS scientists should be available to develop "white papers" as needed to put sense into regulation. Regulatory agencies will come up with something, even without scientific information. Need to use "good science", but how do we judge what is "good science". Scientific information needs to get to reg agencies before regulation is made.
- ARS research needs to communicate to industry through -Tech transfer, education, "communication specialists", etc. ARS needs to work better with extension. ARS needs to partner with industry, sister agencies, extension, specialists, people who are charged with producer/user education and communication.
- Partnering without competition important.
- Systems that producers have the ability to use. Complexity of new technologies may necessitate management partnerships. May need partnerships with producers, large companies, cooperatives, etc to maximize economic/environmental returns.
- Very rapid demand for all ag-derived products in the near future, along with diminished land resource base and higher environmental demands. Need more efficiency, lower inputs, total usage of all products and by-products.
- Competition with industry (economic sustainability)? Industry heavily invested in environmental research. ARS info being used for broad public benefit. Solid, impartial information always valuable. No competition. Lots of small private interests, but "Snake oil" needs to be verified through solid research.
- Need research to show how "green" Ag is already.
- Need to have dialog to educate reg agencies on impact to agriculture. Impact on small producers of most regs will be severe.

Lindbergh Room A—Facilitator: Daniel Miller

Recorder: William Rice
Reporter: Gene Gourley

High Impact Research, Education, and Tech Transfer Needs

Major issues five years ago:
P runoff (P index)
NC superior waste – Trt systems
Air Quality
Odor, NH3,
Pathogens
Antibiotics
Byproducts
Economic manure management
Regulatory realism – attainable goals
Gap in baseline data (air & water pollutants) no source identification (Source inventory)
Gaps in P transport with respect to scale issues
Issues with soil test P values (water P values not used in regulations)
Field system soil P issues

Success stories –
In NC superior waste treatment systems
Heavy metals
P index – broadly instituted across states
In Arkansas to develop site specific P values
Spatial scales (water quality on larger watersheds)
N management – runoff controlled drainage

Today's issue
Sources within large scales
-golf courses vs swine operation
-point source vs nonpoint sources
-sources nutrients, pathogens, PAC,
-source inventory

Baseline emissions
-Easy ones (NH3, PM, H2S)
-Emerging ones (VOC, GHG)

MAJOR ISSUES
Agricultural uses of By products of
Energy (gypsum)

Feed
Construction, forestry
Foundry sands

All four components
byproducts
Emissions
Nutrients
Pathogens

NEXT FIVE YEARS
Whole farm nutrient balance

Energy?
Efficiency factors in feeding affects all subsequent operations
-particle size (digestibility)
Effects everything

Systems perspective – life cycle analysis
GHG – life cycle analysis

C-sequestration as it relates to manure
Economics benefits beyond C,N,P,K
C trading
Microbial soil quality

Air handling treatment systems for animal facilities
Mitigation at two scales (dusts and PM) immediately, odors VOC at a distance

Harnessing microbial potential

Regional issues
Sustainability
Economic costs of dealing with nutrients N,C,P,K movement
Use of manure as fertilizer $
Movement of N – needs to be controlled

Climate change (more neg on animal production than)
Air quality, pathogens, hormones, antibiotics (public health issues of production agriculture will be more important)

Good science, pathogen issues (risk assessment?)

Water efficiency utilization

IMPORTANT CONSIDERATIONS TOP PRIORITY

A

1) Energy
2) Climate change
3) Connections of air quality, pathogens, hormones, antibiotics to public health

B

1) Nutrients
2) Energy
3) Climate change

C

1) carbon sequestration / GH gas emmisions
2) Energy development from waste and bio products
3) Water conservation
4) Baseline emissions

D

1) Potential pollutant quantification/Inventory/baseline water & air
2) Ag systems analysis for issues in context energy pollution GHG
3) Manure by product handling to transport options

E

1) Baseline atmospheric emission
2) air treatment systems /emissions mitigations
3) Life cycle analysis

F

1) energy policyimpacts to all above (four components)
2) source inventory / baseline
3) whole farm inventory / baseline & quantification methods

G

1) Control mechanisms for odorant gas emissions nutrients
2) C sequestration & benefits form manure byproducts
3) Potential use of byproducts for energy or nutrient source
4) Source identification & baseline identification
5)

- nutrient management,
- air quality,
- pathogens,
- pharmaceuticals,
- energy,
- by-product utilization

Lindbergh Room B—Facilitator: Allan Torbert

Recorder: April Leytem
Reporter: Mark Bryant

High Impact Research, Education, and Tech Transfer Needs

Priority needs for next 5 years:

Happy with Rob Dungan's work on foundry sands, would like to find beneficial uses for these sands. Byproducts of coal combustion are an issue that needs to be addressed. Do a risk assessment to support increased utilization of CCP's and FGD gypsum. Investigate the issue of mercury using rainfall simulations. Mercury capture and re-release is an issue. Water retention affected by gypsum application. Effective utilization of CCP in feedlot treatments.

Improve beneficial uses of byproducts (FGD gypsum and CCP)

Pathogen issues, air emissions (hazardous and GHG), new issues. Issues related to nutrient management need to come to fruition. Strategies in livestock waste: extract energy, control pathogens, make a uniform product for nutrient extraction, reduce waste handling, soil compaction, come up with a comprehensive system to address these production issues (focus on waste streams). Waste to energy (digesters). Improve waste stream management efficiency. The economics of energy production (carbon credits, etc.). Deal with the pathogen issue. Extraction of P from waste streams, stabilize N. Reduce the amount of waste applied to fields which reduces transport and compaction on fields. Use of a gasification system to generate energy from manures.

Develop comprehensive waste management systems that capture energy and nutrients, reduce waste volume and kill pathogens

Need to get information out to producers. Need to improve networking between organizations to get the information to the customers (tech transfer). Utilize partner opportunities with extension, etc. and have an information clearinghouse.

Improve networking in order to get information to producers.

Utilize manure to generate value for the nutrient content. Turn waste streams into revenue streams. Need to recognize the economics based on size of facilities, develop cost effective solutions at all scales of operation. Improve nutrient management techniques on the smaller scale operations. Synthesis of information generated by researchers into a systems approach to deal with waste management issues.

Turn waste streams into revenue, address the issue of economies of scale.

There is now information related to application rates that were not available before. Utilizing manure as a resource instead of a waste product.

Comprehensive long term whole systems approach to waste management is something that would be best handled by ARS research programs.

Need better coordination of research efforts across all groups (ARS, private industry, University, etc.)

Add bioenergy as a component in the new action plan dealing with energy from manure?

Carbon credit trading and the effects on GHG emissions. Look at the carbon footprint of facilities and the land footprint of production facilities. Looking for opportunities to generate carbon credits on farms.

Emission credits need to be looked at. The area of air emissions from livestock operations is critical, quantifying them and turning that into process models. ARS could take the lead to drive this research. Ozone, VOCs, SO2, NOx, CO2.. Look at a national scale and across the livestock sector. How do we generate a benchmark for emissions. Also how will emissions offsets play into the credits.

Evaluate the emissions/carbon credit systems and the ultimate impact on the environment.

Research in air emissions from livestock operations is critical especially quantification and developing process models.

The research that has been done by ARS in P indexes and nutrient management have been very valuable. But there has been no data that show that nutrient management plans have impact on water quality. What is the benefit of BMPs related to water quality. Need more research on the implementation of nutrient management plans and what is and is not effective. Provide easy to use tools for managers and determine how effective tools are in improving water quality. Need an analysis of cost (effort) vs. the benefits from different practices.

What is the benefit of implementation of BMPs on water quality, what tools are available and what is the cost (effort) vs the benefits of these practices.

Are soil test P limits that are set appropriate?

Finding alternatives to bedding materials in broiler production. What are the benefits of windrow composting in poultry litter, pathogen kill, benefits of litter re-use. What is the nutrient value of the cake that is removed from houses. What can be done to improve the re-use and value of litter in houses and the nutrient value of litter removed.

Benefits of re-using litter in broiler houses (windrow composting).

FGD gypsum use in restoring degraded or marginal lands to increase productivity of these soils. The carbon holding capacity and CO2 benefits of applying gypsum to degraded lands. Also improve the sodium ratios of sodic soils.

Be thorough and get it right the first time when we implement new technologies.

The issue of decommissioning animal waste storage facilities (lagoons) how can we do this economically.

Health issues related to animal production and waste management, air and water quality. How do we improve stewardship. We are the Stewards of the land and environment!