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**International Symposium on Air Quality and Waste Management for Agriculture. CD-Rom Proceedings of the 16-19 September 2007 Conference (Broomfield, Colorado)**
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# National Livestock and Poultry Environmental Learning Center

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*Abstract. This paper describes a new national learning center designed to improve the delivery of science-based information to non-research customers. The vision of the Livestock and Poultry Environmental Learning Center is to provide individuals involved in public policy issues, animal production, and delivery of technical services for confined animal systems with on-demand access to the nation's best science-based resources that is responsive to priority and emerging environmental issues associated with animal agriculture. This project will test innovative approaches such as a web cast seminar series to connect national experts with those individuals and organizations that influence animal producer decisions on manure management issues. This paper describes the implementation of the innovative approaches used delivery of research based knowledge by the learning center .*

Keywords: extension, manure, water quality, learning center.

## Dedication

The authors wish to dedicate this paper to Frank Humenik who passed away on March 28, 2006. Frank was a co-investigator for the project described in this paper as well as a respected leader, peer and friend. His commitment to national leadership for animal manure issues including extension programs impacted many who work in this issue area. The ideals in which Frank invested his energy are embedded in every aspect of this project. Dear friend, you are deeply missed.

## Introduction

Significant challenges exist in the delivery of science-based information on animal manure management issues to non-researchers who influence the decisions of livestock and poultry producers. The need for information is a result from the expectation of animal producers to adopt practices that meet environmental policy. Our primary challenge is to rapidly translate research findings from USDA Agricultural Research Service (ARS), land grant universities (LGUs), and others contributing new knowledge in a meaningful way for non-research clientele.

This paper describes a national education center to improve the delivery of science-based information to the non-research customer. The vision of the Livestock and Poultry Environmental Learning Center is to provide individuals involved in public policy issues, animal production, and delivery of technical services for confined animal systems with on-demand access to the nation's best science-based resources that is responsive to priority and emerging environmental issues associated with animal agriculture. USDA Cooperative States Research, Education, and Extension Service (CSREES) sponsored National Integrated Water Quality Program (National Facilitation Project) has provided initial funding of $300,000 for a national Learning Center targeting priority water quality issues specific to animal manure management. It is the intent of this center to test and demonstrate the role of a national Learning Center in improving the access of those individuals who influence livestock and poultry producers on animal manure management decision to the best science of land grant universities and agencies.

## Statement of Problem

Agriculture has been identified as the leading contributor of pollutants to the nation's rivers and streams

as well as lakes and reservoirs by the National Water Quality Inventory: 2000 Report (US EPA 2000). Although it does not separate animal agriculture from other agricultural enterprises, the report notes that pathogens, nutrients, and oxygen-depleting substances associated with manure are three of the top five pollutants. Because of potential environmental concerns associated with animal production, two national public policy initiatives currently address environmental management in animal agriculture. US EPA and USDA Natural Resources Conservation Service implement the National Pollutant Discharge Elimination System (NPDES) Permit Regulation and Effluent Limitation Guideline for CAFOs (Federal Register 2003) and Environmental Quality Incentives Program, respectively.

At the same time that these significant public policy initiatives are being implemented, the animal industry is being asked to respond to potential water quality issues associated with pathogens and pharmaceuticals, potential application of federal Superfund policy reporting policy to animal agriculture, proposed changes to the Clean Air Act rules for particulate matter emission, and local policy affecting zoning of agriculture. In this environment, producers and advisors are challenged to understand and apply good science to this myriad of existing and emerging issues.

The quality of and timely accessibility to science-based information is a significant weakness of our current outreach infrastructure. The USDA/EPA National Unified Strategy for Animal Feeding Operations states that "Knowledge gaps exist in our understanding of the effects of AFOs on natural resources and environmental quality. Some of this lack of understanding is due to the fragmented structure of our research and data collection efforts, information residing in multiple locations … and different information being used by AFO managers, technical assistance specialists and regulators." (USDA and EPA, 1999).

## Commitments of this Project

A national team representing a broad spectrum of those creating, delivering and utilizing research-based knowledge will demonstrate a national Livestock and Poultry Environmental Learning Center committed to:

- Implementing a customer driven approach that will identify critical or emerging issues and evaluate innovative technology transfer models.
- Coordinating for each priority issue the assembly of our best science-based information from multiple organizations for national delivery of timely and user-friendly resources.
- Developing and testing innovative outreach models for connecting those who are creating new research knowledge with the end users of that knowledge.
- Identifying appropriate national learning center roles that best support an existing network of organizations committed to an outreach mission.

This project will utilize and support the existing network of public and private sector organizations delivering information to clientele. The project will target groups and organizations that influence animal producer decisions on environmental issues including commodity groups and agricultural organizations, public and private sector advisors, those involved in public policy development and application.

## Implementation Plan

*Objective 1. Implement a national outreach education initiative responsive to customer priority issues.*

This project has initiated a “Customer Advisory Team” representing 13 stakeholder organizations that will 1) Identify priority and emerging issues; 2) Assist in the delivery of the innovative outreach models tested by this project; and 3) Evaluate the effectiveness and impact of a National Learning Center (see Appendix A). The customer advisory team led the implementation of a national wide survey of water quality issues associated with animal quality. The information provided a basis for the advisory team’s selection of priority issues for this project. 345 survey responses were received representing 41 states. Those who responded were asked to rank their 10 most important issues from a list of 22 possible topics (results not shown) and select one current and one emerging issue for which they would attend a workshop (Figure 1).

Based upon survey results and professional judgments, the customer advisory committee selected three priority issues for the Learning Center project 1) Integrated nutrient management planning; 2) Value of manure, and 3) Alternative technologies. Upon a review of these priorities by the project’s outreach team, a priority specific to pathogens and pharmaceutical water quality issues was added. The highest priority emerging issue identified by this survey, ammonia volatilization, was not raised up as a priority due toa

recommendation from our funding source, CSREES National Integrated Water Quality Program, that our team not address air quality issues. A recently initiated project team addressing livestock air quality issues is planning a similar outreach program. We hope to address the issue of ammonia volatilization by partnering with this group in 2008.

*Objective 2 Establish the infrastructure for a sustained national outreach initiative with its foundation based upon a multi-disciplinary, multi-organization "National Outreach Team" of experts.*

This National Outreach Team will improve linkages between organizations with outreach capabilities

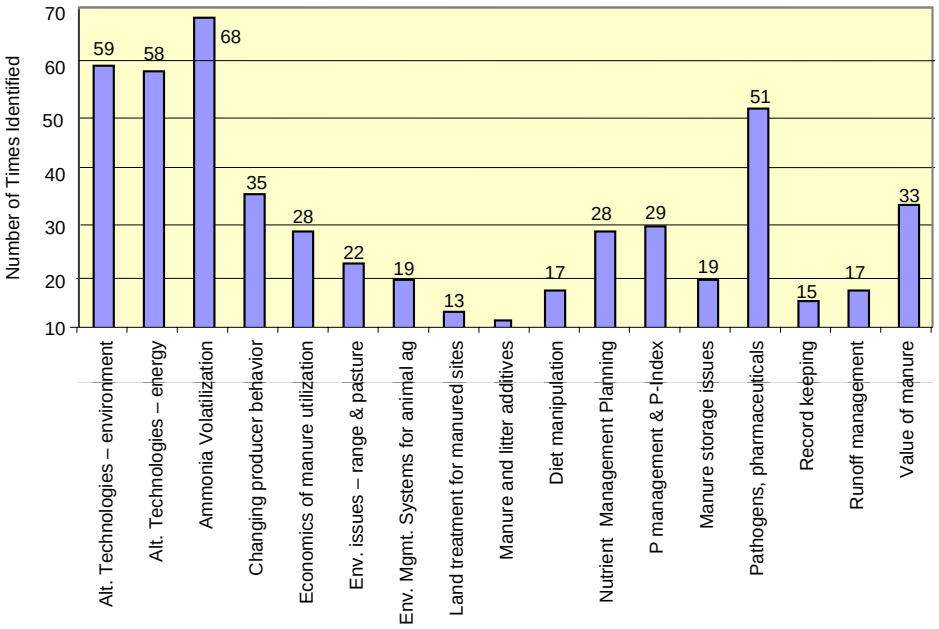


Figure 1. Number of times an issue was identified as a priority or emerging issue for which the individual would attend an expert workshop. Closure of storage, emergency response planning, land application equipment, mortality management and risks from micro-nutrients were identified 10 or fewer times.

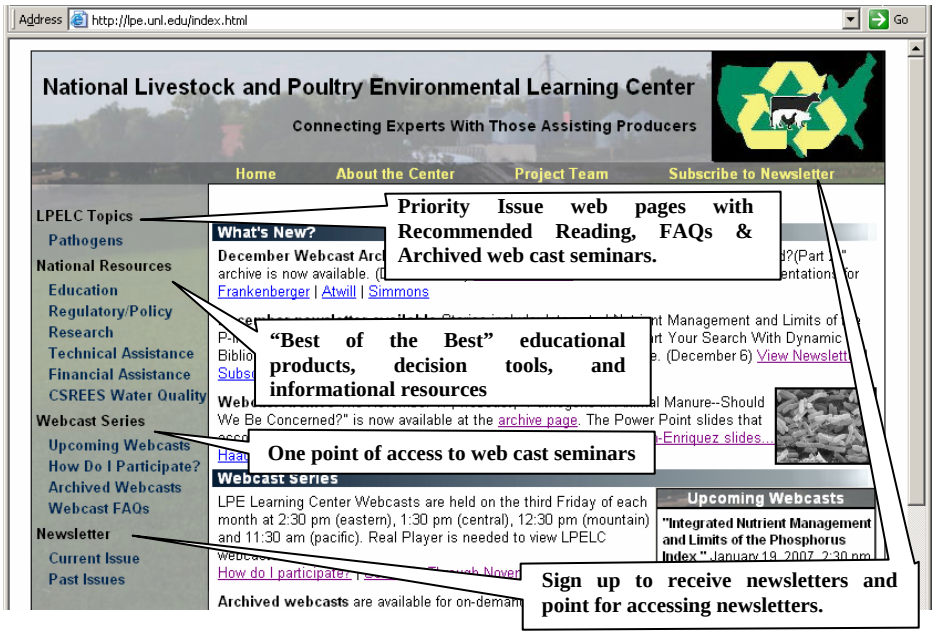


Figure 2. Livestock and Poultry Environmental Learning Center web site including primary resources.

and organizations that produce research (LGU, ARS, USGS, EPA), educational (CSREES, US EPA Ag Center), and planning products (NRCS). The Outreach Team initially includes 17 individuals listed in Appendix A. Additional individuals are being actively recruited to assist as experts for the four priority issues and related activities.

To implement the activities proposed by this national initiative, this team has established work groups addressing customer identified priority issues (see Appendix A). Additional work groups addressing air quality issues and small farm issues are in the planning stages. Work groups identify and implement the technical content to be shared primarily through live web cast seminars and a web based Learning Center. The model developed by the Pathogen and Pharmaceuticals team will be discussed in greater detail later.

*Objective 3 Deliver innovative products that provide a national audience on-demand access to our best science-based resources.*

It is the intent of the Learning Center to test innovative learning technologies for connecting national experts with those individuals that influence livestock and poultry producer decisions. The national web cast seminar series (Figure 3) and Learning Center web site (http://lpe.unl.edu , Figure 2) provide a foundation for this initiative. Our national survey inquired about current and future technologies that our customer prefers for learning new information. One-on-one communications, educational programs or workshops, and farm tours are identified as a current preference. Web sites, email, and electronic listserves are the most frequently used technologies and lower as a preferred technology. When asked which future delivery technologies they would use to learn new information, "Research Updates" for lay audiences and jointly sponsored websites rated the highest (Table 1). Web-cast workshop and virtual on-farm tours were rated between medium and high.

Table 1. Summary of future delivery approaches would be tried to learn new information

| Approach: | Average rating |
|---|---|
| Web-cast workshop presented by national experts accessible live from your computer | 2.30 |
| Virtual on-farm tours (web-accessible) of alternative technology demonstrations | 2.36 |
| Fact sheet style "Research Updates" for lay audiences… | 2.03 |
| Jointly sponsored (LGU, USDA, EPA, USGS) national website | 2.09 |

Scale was 1=high, 3=medium, 5=low

## Outreach Model Implemented on Pathogens

Following the identification of priority issues, an issue team focused on pathogens and pharmaceutical was established and selected to demonstrate an initial model for implementation of the outreach activities of the learning center. At the time of preparation of this paper, this team was nearing completion of the pathogen outreach effort. A description of key components of outreach model implemented by this team is discussed below.

An Issue Team was assembled and included research scientists from USDA Agricultural Research Service, US Geological Survey, US Environmental Protection Agency as well as research and extension faculty from five universities. In addition, representatives of Environmental Defense and US EPA Agricultural Compliance Assistance Center contributed to the groups activities. Access to both the research and extension communities as well as organizations outside the traditional land grant university system were key elements contributing to the success of this issue team.

National Web-Cast Educational Workshops. The issue team developed a plan for two web cast seminars that involved five presenters addressing the topic of "Pathogens in Animal Manure--Should We Be Concerned?". The web cast seminars were presented in November and December 2006**.** Based upon advice from our Customer Advisory Team, 30 to 60 minutes seminars were targeted. The topics and presenters included:

Understanding Pathogens and their Characteristics – Jeanette Thruston-Enriquez, USDA ARS
Case Studies of Manure Related Outbreaks – Sheridan Haack, US Geological Survey
How Pathogens from Livestock Can Move to Water Resources – Jane Frankenberger, Purdue University
Managing Pathogen Risks for Livestock on Pasture and Rangeland – Rob Atwill, University of California, Davis

Figure 3. Sample visual from web cast seminar presented by ARS scientist, Jeanette Thurston-Enriquez, on "Understanding Pathogens and their Characteristics".

Alternative Systems for Managing Microbial Pathogens on CAFOs - Chip Simmons, North Carolina University, Chapel Hill

All web casts (Figure 3) are presented live with opportunities for participant interaction and questions. In addition, web casts are archived for viewing. During November 2006, three archived web casts were viewed 500 times. This usage suggests a significant interest in the archived presentations. This project will continue to deliver live web cast seminars on the third Friday of each month from 1:30 to 2:30 pm Central time as well as archival access to all presentations. Our early experience suggests that this technology has significant opportunity for connecting national experts and audiences from widely dispersed locations for cost effective educational experiences.

Web-based Learning Center. The pathogen team made accessible three web resources targeting pathogen issues including the archived web casts, recommended reading, and Frequently Asked Questions. The recommended reading section included the "Best of the Best" educational products and peer reviewed research summaries. We used three questions in our selection process of the "Best of the Best" educational products including 1) Succinct summary of current issues?; 2) Appropriate for farm advisors and producers?; and 3) Technically accurate? This web site has been available for a period of less than six weeks at the time of preparation of this paper and so no usage statistics are available.

The team has also invested significantly in development of responses to Frequently Asked Questions (FAQ). The relative lack of educational resources and the expertise offered by our team suggested that a data base of FAQs would be of value. At this time, approximately 40 FAQs on the following topics are available:

- Types of pathogens, characteristics, and risks associated with animal production.
- Pathogens and human health related risks
- Fate and transport of pathogens include risk to drinking water supplies
- Best Management Practices (BMP's) for minimizing risks
- Identifying the source of pathogens

## Impact of Program

At the time of preparation of this publication, the project has supported an active web presence for a six month period and a completed four web cast seminar presentations. Despite the limited experience of this

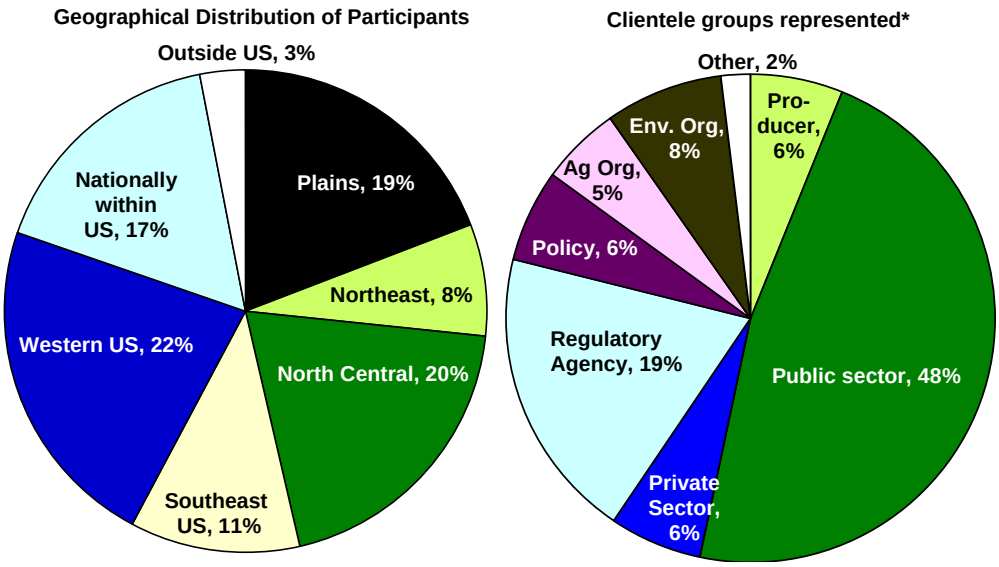


Figure 4. Geographic and clientele group distribution of participants for the November web cast seminar on Pathogen Issues attended by about 240 people.

outreach effort, several early indicators of outcome and possibly impact are available including:

- More than 800 individuals are currently enrolled to receive a monthly newsletter from the Learning Center. We connect twice each month with this audience through our newsletter and an announcement for a web cast seminar.
- Our November web cast reached approximately 240 individuals nationwide. Those in attendance interact with approximately 30,000 livestock and poultry producers annually.
- Participation in web cast is being used by 85% of participants to improve their knowledge, by 51% for educational programs, by 47% for educational programs, and 49% for regulatory and policy discussions.
- We are reaching a reasonable regional distribution of individuals (Figure 4). However, our current efforts are reaching primarily public sector audiences (extension and NRCS) and regulatory audiences. The need exists to expand our outreach into the private sector industry that is advising animal producers.

## Opportunities for Additional Participants

This project is an effort to evaluate and demonstrate the value of national cooperation in making science-based information more readily accessible to our customers. Individuals interested in assisting in this process are encouraged to share that interest with our current team. Some potential needs/opportunities the project include:

___ Serving as a technical expert on one of the issue work groups. We are currently utilizing individuals for topics specific to manure value, integrated nutrient management, alternative technologies, and pathogens and pharmaceuticals.

___ Sharing with outreach team members information on emerging science that has potential for application in addressing environmental issues associated with animal feeding operations. Presenters for future web casts on our emerging science are continuously sought out by our team.

___ Proposing a new issue work group that would assemble appropriate educational products and sponsor a short seminar series. We are currently recruiting individuals and looking for financial resources to support an air quality and small farms work groups.

___ Expanding awareness of the Learning Center. As announcements and newsletters are released, especially during the start up phase of this project, expanding our clienteles' awareness of the educational products, including the monthly web-cast seminar series, accessible from the Learning Center. Individuals with state and regional responsibilities will be an extremely important connection between the national Learning Center and our locally based customer.

## Conclusions

The rapidly changing expectations of livestock and poultry producers to address livestock and poultry environmental stewardship challenges our current delivery of research based information in a timely fashion to our non-research customers. The Livestock and Poultry Environmental Learning Center is

- Implementing a national outreach education initiative that is responsive to customer identified priority issues.
- Establishing the infrastructure for a sustained national outreach initiative with its foundation based upon a multi-disciplinary, multi-organization "National Outreach Team" of experts.
- Delivering innovative products including a national web cast seminar series that connects experts with a national audience that advises or influences animal producer decisions. These outreach products will provide clientele with on-demand access to our best science-based resources.

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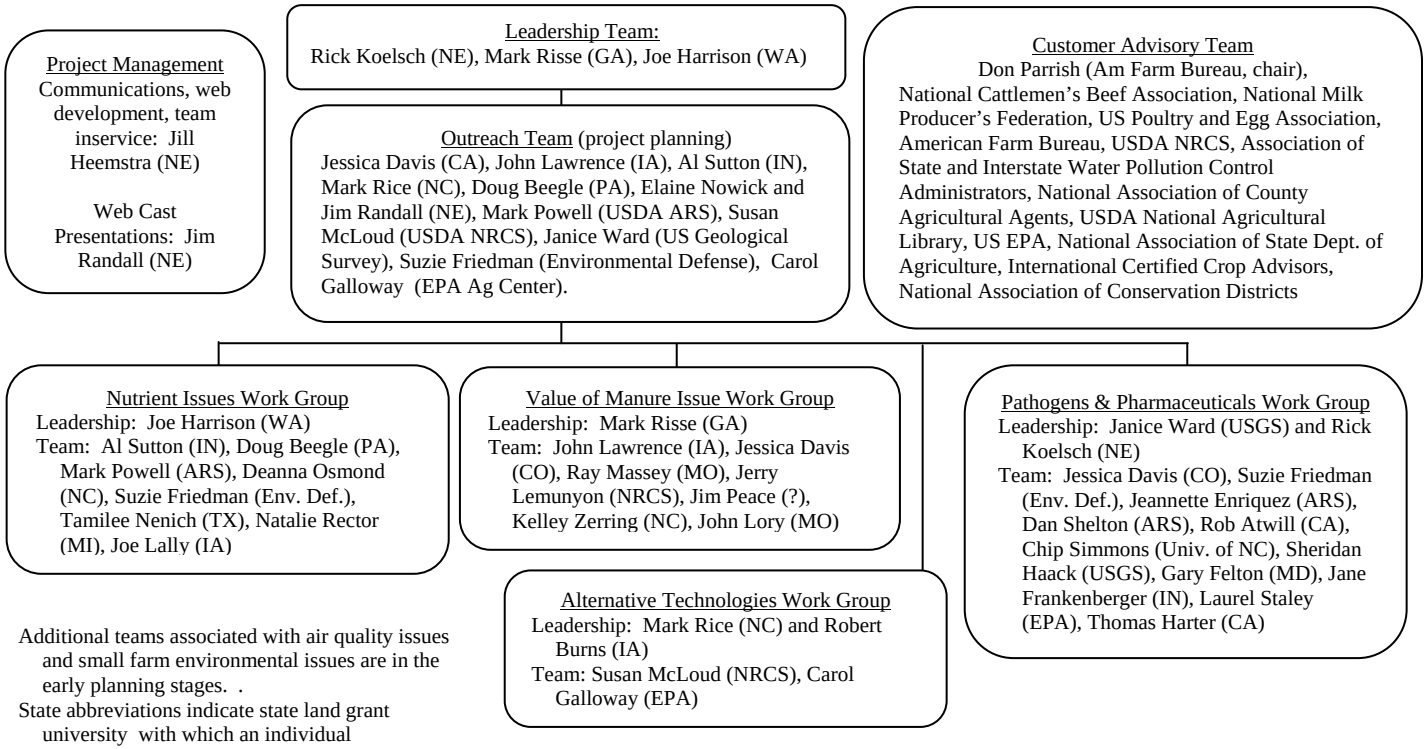
## Appendix A. Organization of the Livestock and Poultry Environmental Learning Center




Additional teams associated with air quality issues and small farm environmental issues are in the early planning stages. .

State abbreviations indicate state land grant university with which an individual is affiliated. All other abbreviations are for the specific organization or agency to which that individual is affiliated.