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“How the Natural Resource Conservation Service is Incorporating New and Innovative Technologies in Manure Management into its Technical Assistance and Program Implementation Activities”

presented by
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The Natural Resources Conservation Service is actively incorporating innovative manure management technology into its technical assistance and program delivery.

Preserving and enhancing the ability to do this was a priority during a recent reorganization of the agency. At the national headquarters, the agency retained an environmental engineer on staff of the Conservation Engineering Division to focus on manure management technology while the Animal Science and Water Quality Division provides leadership in policy development and working with other agencies. Three National Technical Support Centers now provide direct technical assistance to the states, and each has an environmental engineer on their core teams with manure management technology responsibilities. Attached to the National Technical Support Centers are nine national teams. Four of these teams, air quality, water quality, soil quality, and bio-energy teams, have a special interest in manure management, but a fifth team, the Animal Waste Utilization Team located in Greensboro, North Carolina, has manure management technology as a primary interest. The staffing plan for the Animal Waste Utilization Team includes a team leader, an agronomist, an air quality physical scientist, an economist, an animal scientist, and an environmental engineer.

The primary tool for technology transfer in the NRCS is through the issuance of Conservation Practice Standards. Existing standards are reviewed and reissued every five years or sooner as necessary and they are written broadly at the national level so that they can be used to implement innovative processes. Sometimes, it is thought that we cannot provide cost sharing on innovative technology because we do not have a Conservation Practice Standard for that technology. Sometimes that is true, but frequently it is not. Standards are written at the component level, and oftentimes the innovative manure management system or process can be implemented using existing standards. If the existing standards are not sufficient it may be possible to grant a variance, or develop an interim standard, but there is a limit. Standards are intended to facilitate the implementation of proven technology. If the technology is experimental, or there is insufficient documentation and experience with the technology so that its performance is questionable, then that technology will likely not be implemented using NRCS practice standards, and other alternatives may need to be considered.

NRCS has been issuing new Conservation Practice Standards (CPS) that can be used in manure management systems. In August of 2000, CPS 656 - Constructed Wetlands was issued, which can be used to implement a wetland component of a waste management system or to reduce the pollution potential of runoff from a livestock facility. In September of 2001, CPS 554 – Drainage Water Management was issued, which can be used to address problems associated with spreading liquid manure of drained cropland. In May of 2002, CPS 635 – Wastewater Treatment Strip was issued, which can be used to implement a vegetative treatment component of a waste management system. In September of 2003, three practice standards were issued to facilitate the generation and capture of biogas from waste management systems. These include CPS 365 – Anaerobic Digester – Ambient Temperature; CPS 366 – Anaerobic Digester – Controlled Temperature; and CPS 367 – Waste Facility Cover. Additionally, in September of 2003, CPS 592 – Feed Management, and CPS 634 – Manure Transfer was issued. Finally, in March of 2003, CPS 316 – Animal Mortality Facility was issued which includes numerous technologies to manage livestock and poultry mortality, and in October of 2003, CPS 317 – Composting Facility was issued to guide composting of mortality, manure, or other organic by-products.
NRCS has recently issued four new practice standards in 2005. In February, NRCS issued CPS 360 – Closure of Waste Impoundments that can be used close agricultural waste impoundments that are not longer needed as a part of a waste management system or to convert them to other uses. In May, NRCS issued CPS 632 – Solid/Liquid Waste Separation Facility, CPS 591 – Amendments for Treatment of Agricultural Waste and CPS 629 – Waste Treatment. CPS 591 and CPS 629 are generic in nature and establish the criteria that amendments or waste treatment technologies do not cover for validation and verification. With this set of standards there should be no technical barrier to the implementation of new and innovative technologies in manure management that are ready for broad application. These standards, in and of themselves, do not address legal, program, or policy barriers.

The Conservation Practice Standards of the NRCS contain minimum criteria for these respective practices to accomplish their intended purpose, but NRCS has also prepared technical materials that provide guidance and recommendations for meeting these standards. In April of 2001, NRCS released Chapter 3 of the Environmental Engineering part of the National Engineering Handbook to provide technical guidance for the use and design of constructed wetlands to treat wastewater from livestock operations. In February of 2002, Chapter 2 of this handbook was released to provide guidance on the design and use of composting facilities. In October 2004, a draft document for the use of Vegetative Treatment Systems for Open Lot Runoff was prepared for NRCS. A revision of Chapter 4 of the Agricultural Waste Management Field Handbook (AWMFH) dealing with Waste Characteristics has been written and will soon be released. It will incorporate the technology in the new American Society of Agricultural and Biological Engineers, Standard D384. Plans are currently being made to rewrite all the chapters of the AWMFH to incorporate a broad range of new technology, with an emphasis on manure as a resource and animal production by-products.

To accelerate the development of innovative technology, there are funding sources available for technology that has not been fully proven. These programs and initiatives are aimed primarily at emerging technology that has already progressed through the experimental stage but still require a more meaningful demonstration on a working scale. The joint United States Department of Agriculture and Department of Energy Biomass Research and Development Initiative is a prime example of such an effort. Even though this initiative is not limited to manure management, six energy projects involving manure have been funded to date. Another funding source is the National and Chesapeake Bay Watershed Conservation Innovative Grants. Here again, while these grants are not exclusively focused on manure management technologies, funding has been provided for twenty-nine (29) proposals involving manure management. A third opportunity for funding is through a cooperative agreement established between NRCS and a not-for-profit organization called Farm Pilot Project Coordination, Inc. (FPPC). Currently there are fifteen (15) approved pilot demonstration projects funded by FPPC. To talk more about their activity, let me introduce FPPC’s General Manager, Bob Monley.
Do you think there is a more effective way to capture the nutrients in the waste stream of our animal feed operations? Or perhaps, you know of a good idea, approach or a technology that just needs further development. Has your idea, system, technology been tested in the real world or on a farm scale level? Can you foresee the opportunity to transform animal manure at our poultry, swine and dairy operation into a value added product? Have you thought about the effects of recent events and how the changing economics and scarcity of energy will impact the treatment of our waste streams? If so, you may be very well interested in the grant opportunities that FPPC has available for technology providers who are developing cost effective waste treatment systems.

By way of background information, Farm Pilot Project Coordination, Inc. (FPPC), a not-for-profit organization, was designated by Congress (Public Law 107-76) to assist in implementing innovative treatment technologies to address the growing waste issues associated with animal feeding operations (AFOs). FPPC is specifically chartered to oversee the implementation and administration of a Pilot Project Program that will demonstrate economically viable innovative treatment systems that reduce the nutrient content of the waste stream from AFOs by 75 percent or greater. Funding for approved Pilot Projects is derived from monies appropriated by Congress and overseen via a cooperative agreement with the Natural Resource Conservation Service (NRCS), a division of the United States Department of Agriculture. Significantly, FPPC fosters conservation, development and wise use of land, water and related resources, while providing AFOs with the opportunity for profitable operation.

Continuing growth in animal production has caused manure management practices to change dramatically. Animals are often kept at different locations as they grow and mature, and do so in environments that are specialized than generalized. An increasing number of animals are raised in buildings where temperature, humidity and other environmental factors are managed to optimize production. Animal manure is collected and frequently used as fertilizer on adjacent cropland or pastureland. As such, manure is both a valued nutrient and an environmental challenge for producers.

These agricultural operations, together with current trends in the industry, raise many environmental concerns regarding water and air quality. The Federal Clean Water Act requires large production facilities to meet the requirements of livestock effluent guidelines. Most states administer the Federal Clean Water Act requirements and incorporate those requirements into permits and State regulations. However, regulations vary widely from state to state and frequently change.

Clearly, the challenge for the industry is to develop manure treatment systems that will handle concentrated animal waste in an economical and environmentally friendly manner. Without viable, nutrient management systems, the industry will continue to be under scrutiny and moratoriums at state and local levels. Consider the consequences as the debate intensifies about the use of clean water, the cost of nutrient management and the impact of environmental regulations. Some have even predicted that food production will ultimately begin shifting offshore.

FPPC however, is determined to find a solution by testing and demonstrating full scale farm systems that are affordable, maintainable and effective at managing the nutrient loads. Significant progress has been made with FPPC initiatives. To date, fifteen (15) pilot projects have been selected for innovative technology demonstration at poultry, dairy, swine and composting operations in seven (7) states: including North Carolina, Florida, Alabama, Texas, Colorado, Utah and Iowa – see Figure 1. These projects are in various stages of development, implementation and operation. Seven (7) pilot projects have completed the demonstration phase, and final reports documenting results are available.
Ideally, FPPC would like to be in every hotspot of the US, but our selection process awards grants to technology providers and farm owners who submit the best ideas or have the greatest potential, rather than the tokenism of a project in every state. Even though this is a problem across the nation, the goal would be to have meaningful projects that match up with a farm demonstration in regions where significant nutrient issues have been documented. The NRCS maintains a county by county map, displaying the excess Nitrogen and Phosphorus concentrations resulting from manure.

Pilot projects are solicited nationwide through a formal request for proposal (RFP) process. Once all proposals are received, an impartial panel of experts grades and evaluates each proposal. This evaluation considers a number of important criteria – see Figure 2. The best of the best are then recommended for funding to the FPPC Board of Directors. Approximately one in five demonstration projects are ultimately approved.

A significant imperative for FPPC is to pursue innovative technologies and waste water systems that have the potential of being commercially viable. To do this, the system designer must offer a reasonable front end
investment and provide a user friendly, rugged system that can be easily maintained by the farmer. A second generation system (shown in Figure 3) was advanced by SuperSoils because a modular engineering approach offered advantages of factory prefabrication, shipping and easy installation at the farm.

Figure 3 – A successful pilot project implemented in North Carolina shows a “prefabricated modular design”

A sampling and monitoring plan is a key part of the pilot demonstration. To ensure objectivity, technology providers are encouraged to utilize a third party partner. In addition, testing and monitoring (see Figure 4) is expected provide performance data over a 12 to 18 months span so that the dry, wet, hot and cold temperature effects can be measured.

Figure 4 - The effect of nutrient reduction is evident from these samples of the waste stream pulled at Posey Dairy
In May of this year, FPPC conducted its first Technology Summit and invited experts from academia, industry and technology leaders and regulators to participate and interact. It proved to be a great networking experience. In May 2006, we will build on our inaugural success and sponsor another summit – so monitor our website at www.fppcinc.org, for more information.

Finally, I’ll close with this reminder. There are some that say because America has been the land of plenty it continues to foster “throw away behavior.” But I think, most of us here today would agree we must accelerate the change to become responsible stewards of our environment. We can no longer afford to waste our water, but we must also revalue what we call waste.