Building Grass-Roots, Intensive, Runoff Water Monitoring Projects: The North Dakota Discovery Farms

Ron Wiederholt, North Dakota State University, Nutrient Management Specialist
Greg Sandness, North Dakota Department of Health, NPS Coordinator

Abstract

Like many states, North Dakota has focused much of its water quality improvement efforts on decreasing the negative risks associated with livestock manure runoff. Regulations have been imposed and significant cost-share dollars have been provided to producers to better manage livestock facility runoff and comply with regulations. North Dakota producers, regulators, academics and conservation managers all agree there is a continuous need to evaluate alternatives to the practices traditionally used to comply with current regulations. Based on feedback from a grass-roots team of affected individuals, a monitoring project was implemented to document the effectiveness of several non-traditional manure management practices. The project, modeled after the Wisconsin Discovery Farms, currently has three farm/ranches enrolled to monitor water quality trends in beef feedlot runoff and tile drain effluent. The project is a combined effort of the producers, NDSU, USGS and the North Dakota Department of Health.

Introduction

There is a well established group of EPA 319-funded watershed projects across North Dakota. These projects have been very effective at improving manure management within livestock feeding areas using tried and true methods. North Dakota also has a well developed set of regulatory policies addressing runoff from animal feeding operations (AFO's). However, to date, there has been very little data collected to directly evaluate the water quality impacts of runoff from small and medium AFO's or measure the benefits of practices used to address the impacts. All affected parties in North Dakota have come together to establish the North Dakota Discovery Farms Program to collect data from working operations to measure the quality of runoff water from agricultural lands and livestock feeding areas as well as document the effectiveness of producer-driven solutions to any identified water quality impacts.

ND Discovery Farms Goals

- Encourage responsible livestock development while protecting our natural resources.
- Ensure a coordinated approach of regulatory practices and policies.
- Document and quantify environmental impacts of farming practices.
- Provide unbiased, reliable information on the relationship between agricultural production and natural resource management.
- Provide enhanced communication between farmers, researchers, educators, the general public and regulatory agencies.
- Establish a network of working farms to evaluate existing and new/innovative agricultural land use practices.
- Provide a platform for agricultural systems research

Figure 1. Aerial photo of feedlot and field surface runoff monitoring stations at location 1.

North Dakota Discovery Farms Timeline

April-May 2007
- Initial contact about developing Discovery Farms in ND
- Identify partners
- Develop Mission and Vision

June-July 2007
- Obtain commitment from partners
- Identify Steering Committee
- WI Discovery Farms tour

Aug-Sept 2007
- Secure funds
- Identify sites and cooperators
- Obtain commitment from cooperators
- Held first steering committee meeting and picked sites

Sept-Nov 2007
- Finalize two sites and monitoring equipment locations
- Install monitoring equipment

Jan-May 2008
- Collect farm background information
- Collect spring runoff samples

May-Sept 2008
- Collect and analyze summer runoff samples
- Identify and finalize tile drain site

Oct-Nov 2008
- Install equipment at tile drain site
- Review operation of other two sites

2009-???
- Develop informational pieces for each location
- Collect and disseminate data from each site

Project Design

The North Dakota Discovery Farms are modeled after the Wisconsin Discovery Farms. At the beginning of the project, a steering committee consisting of producers, commodity groups, researchers, technical service providers, regulators, and other state agency personnel met in mid-2007 to decide what issue to focus on and select the original two core farms. The focus chosen was runoff from small to medium animal feeding operations and sites in east-central and central North Dakota were selected as the first two core farms. Volunteer farms were identified through EPA 319 watershed projects that represented a broad geographic area with possible water quality impact. In mid-2008, a third core farm was selected to monitor tile drainage and is located in eastern North Dakota.

Each cooperator is expected to be involved in the project a minimum of 5 years. If a water quality impact is identified, the producer is the person who will decide what action to take and monitoring will continue.

Monitoring Protocol

In cooperation with the USGS, gaging stations were placed at channelized flow locations at each site to capture isolated surface runoff from the feeding areas and agricultural fields. Each gaging station includes a flume to determine flow, an automated, refrigerated ISCO sampler and equipment to transmit data via cell signal. The samplers can be monitored and operated remotely by USGS personnel. At each farm, there is weather instrumentation to capture environmental conditions.

The samples are collected immediately after an event and flow-weighted samples are analyzed for suspended sediment, total dissolved solids, total nitrogen, ammonium, nitrate , organic nitrogen, total phosphorous (P), dissolved reactive P and chloride.

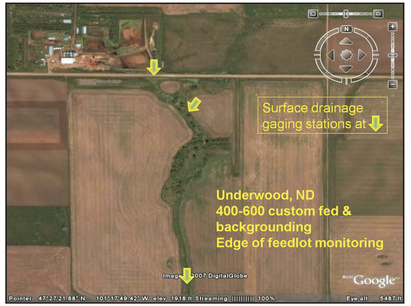

Figure 2. Aerial photo of feedlot and field surface runoff monitoring stations at location 2.

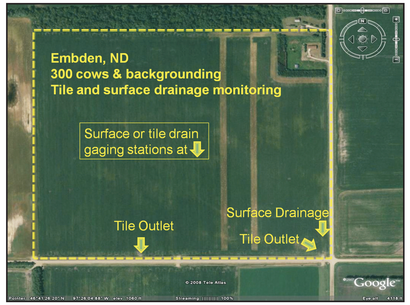

Figure 3. Aerial photo of field surface runoff and tile drainage monitoring stations at location 3.

Figure 4. Gaging station that includes flume, ISCO sampler and data transmission equipment.

Cooperators

- Kim and Denise Amann
- Doyle and Patsy Johannes
- Kent and Sandy Bartholomay
- NDSU Ag Experiment Station
- NDSU Extension Service
- USGS
- ND Dept. of Health
- ND Water Commission

Thank You

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Carrington Research Extension Center

NDSU
NDSU Extension Service
N.D. Agricultural Experiment Station
North Dakota State University

USGS science for a changing world

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