MT 09/05

USDA

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

September 2011

NRCS

Comprehensive Nutrient Management Plans

Introduction

In 2010, Montana had 29,400 farms and ranches. Livestock and poultry are the primary product on more than 15,000 of those operations. In 2009, animal agriculture in Montana generated about $1 billion in farm revenue. Agriculture accounted for more than 56 percent of the value of all agricultural products marketed. Clearly, livestock production is an important part of Montana's economy and food supply. Along with the many benefits that animal agriculture provides, it also produces by-products, such as manure, litter, and wastewater. Because of their potential to affect environmental, animal, and human health, Animal Feeding Operations (AFOs) have emerged as a major environmental issue in Montana, as well as the rest of the United States.

There are two types of pollution - point and nonpoint. Nonpoint source pollution is not federally regulated; however, point source pollution is regulated at both the state and federal levels. AFOs meeting specific criteria may be designated as point sources of pollution or Concentrated Animal Feeding Operations (CAFOs), which requires a discharge permit from the Montana Pollutant Discharge Elimination System. Regardless of source, landowners and livestock producers are responsible for controlling any pollution on their property.

The USDA Natural Resources Conservation Service (NRCS) can help by providing technical and financial assistance for the development of alternative uses of manure, timing and application, storage facilities, and improved feeding management technologies.

Environmental Impacts

The structure of Montana animal agriculture has changed over the last decade or two. Following the national trend, the total number of livestock operations has declined across the state, while the number of animals produced has increased slightly. This translates to a higher concentration of animal units per operation. Therefore, the need for effective animal waste management has grown. The following are just a few of the waste management challenges livestock producers face today:

- Nonpoint source pollution of water resources;
- Point source pollution from feedlot or holding areas;
- Developing land-based manure management strategies for proper timing and rates of manure application, application methods, and application rates;
- Greenhouse gas emissions (e.g. methane, nitrous oxides, carbon dioxide);
- Air quality (odors); and
- Non-nutrient animal waste issues (e.g. pathogens and pharmaceuticals in manure).

Comprehensive Nutrient Management Plans

NRCS can assist livestock producers in developing a Comprehensive Nutrient Management Plan (CNMP). Through this process, the producer and the NRCS evaluate nutrient management considerations and prepare alternatives that meet producer objectives and protect water resources.

The CNMP is a flexible planning process that can be crafted to fit livestock operations of all sizes. A CNMP addresses nutrient management, land treatment, manure and wastewater storage and handling, and includes considerations for record keeping, feed management, and alternative use strategies.

While NRCS works with livestock owners on a voluntary basis, a CNMP can also help meet requirements of federal or state regulation.

A CNMP addresses all aspects associated with manure and land application from an AFO where manure is handled, stored, and/or applied to land. CNMPs for CAFOs are modified to provide the added components of a regulatory Nutrient Management Plan.

NRCS Comprehensive Nutrient Management Plan: Six Components	DEQ MPDES Nutrient Management Plan: Nine Minimum Practices	Key Differences
Nutrient Management This component addresses the requirements for land application of nutrients (N, P, K) and organic by-products to minimize environmental risk associated with nutrients. Plan would include a nutrient budget for N, P, and K. Plan would address crop plans and yield goals, soil and manure testing, and timing and method of application. In addition to nutrients, plan must address air quality, pathogens, and salts and heavy metals, if they are a concern.	**Protocol for Manure and Soil Testing** Identify and implement specific manure, wastewater and soil sample collection and analysis protocols to be used in developing and implementing the nutrient management plan. At a minimum, the protocol is to specify the collection and analysis of manure, litter, and other process wastewaters annually for nutrient content and the collection and analysis of soil samples for phosphorus content at least once every five years for all fields where manure and wastewater may be applied. **Protocol for Land Application of Manure and Wastewater** Develop and implement protocols to apply manure, litter, and process wastewater in accordance with the technical standard for nutrient management established by the DEQ.	An NRCS CNMP is inclusive of all nutrient management issues required in an MPDES NMP. NRCS CNMP includes planning elements relative to air quality, pathogens, and heavy metals not critical to an MPDES NMP.
Record Keeping The purpose of this component is to document implementation and management activities associated with an AFO's CNMP to allow adjustment of a CNMP to meet production and conservation objectives. Recommended records focus on those required for nutrient management planning, emergency response, maintenance, and third party reviews.	**Record Keeping** Maintain all records necessary to document the development and implementation of the nutrient management plan and compliance with the minimum practices defined in the permit. In addition, records must be maintained that document compliance with the effluent limitations specified in the permit.	Expectations of NRCS CNMP and MPDES NMP are very similar.
Feed Management Feed management activities designed to reduce the nutrient content of manure and land requirements for nutrient management is the focus of this component. Feed management is suggested as a planning consideration, but not as a specific requirement for individual AFOs.		Feed management activities are not recognized by the MPDES permit process as being required for a permit. However, an AFO may want to identify implemented technologies and management practices contributing to reduced N and P excretion.
Other Utilization Activities Environmentally safe alternatives to land application of manure, manure use for energy production, methods to reduce the weight, volume, or form of manure, manure mixing with industrial or municipal byproducts to produce value-added material, and transportation and marketing options for moving manure from areas of over supply to areas with nutrient deficiencies, and treatment technologies are potential options.		Other utilization activities are not specifically recognized by the MPDES permit process as being required for a permit. However, other utilization activities that relate to manure export or availability of N and P should be clearly defined for an MPDES NMP.

The table includes text taken directly from (or summarized from) EPA's NPDEA Permit Writers' Guidance Manual (http://www.epa.gov/npdes/pubs/cafo_permit_guidance_chapters.pdf) and NRCS Comprehensive Nutrient Management Planning Technical Guidance (http://policy.nrcs.usda.gov/scripts/lpsiis.dll/H/H_180_600_E_5.htm). This table originally appeared as an article titled "Comparing a CNMP with EPA's NMP" by Rick Koelsch, University of Nebraska, in Animal Manure Management Monthly on April 20, 2004.

Comparing a CNMP with an NMP

Differences exist between a Comprehensive Nutrient Management Plan (CNMP) and a Nutrient Management Plan (NMP). A CNMP is developed for Natural Resources Conservation Service (NRCS) programs, while a NMP is prepared to address the requirements of a Montana Department of Environmental Quality (DEQ) Montana Pollutant Discharge Elimination System (MPDES) General Permit. The differences between these two plans may be important as such plans are used interchangeably to address the needs of both situations. The table below summarizes key elements of each nutrient planning process and some of the differences that may exist.

Contact DEQ's Water Protection Bureau at (406) 444-3080 for more information or asistance with the Montana Pollutant Discharge Elimination System General Permit and Nutrient Management Plan requirements. Online information is available at http://www.deq.state.mt.us/wqinfo/mpdes/cafo.asp. For more information or planning assistance with CNMPs, contact your local NRCS field office. You can also visit the NRCS website at http://www.mt.nrcs.usda.gov/.

NRCS Comprehensive Nutrient Management Plan: Six Components	DEQ MPDES General Permit Nutrient Management Plan: Nine Minimum Practices	Key Differences
Manure and Wastewater Handling and Storage This component addresses activities associated with the production facility, feedlot, manure and wastewater storage and treatment structures and areas, and any areas used to facilitate transfer of manure and wastewater. It includes review of issues associated with air quality, pathogens, diversion of clean water, and mortality.	**Adequate Storage Capacity** This element addresses 1) planning sufficient storage capacity for manures, process waters, and contaminated runoff, 2) prevention of runoff from dry manure, 3) matching storage capacity to nutrient plan, and 4) ensuring proper operation and maintenance of storage facilities.	NRCS CNMP includes planning elements relative to air quality, pathogens, and issues associated with production facilities (animal housing) not specifically identified under MPDES NMP. MPDES General Permit NMP emphasizes as distinct planning components for the topics of 1) mortality planning, 2) diversion of clean water, and 3) prevention of animal contact with state waters. These components are included as needed in an NRCS CNMP but not emphasized as a separate component.
	Proper Management of Mortalities Objective is to prevent contamination of state waters.	
	Diversion of Clean Water Planning to divert roof water and runoff from adjacent land is recommended. If not, this clean water must be collected and stored.	
	Prevention of Direct Contact of Animals with State Waters Develop and implement appropriate controls to prevent access of animals to state waters.	
	Chemical Handling Develop and implement controls to prevent the inappropriate introduction of chemicals into the manure, wastewater, and storm water storage and handling system.	This component is unique to the MPDES NMP. A supplement to an NRCS CNMP may need to be included addressing chemical handling to satisfy the MPDES program.
Land Treatment Practices This element addresses evaluation and implementation of appropriate conservation practices on sites proposed for land application of manure and organic by-products. A conservation plan to address runoff and soil erosion and allow for plant uptake of these nutrients is accomplished through this component.	**Conservation Practices to Control Nutrient Loss** For land application areas under the control of the CAFO operator develop and implement practices that are sufficient to minimize the discharge of pollutants to state waters. These practices may include residue management, conservation crop rotation, grassed waterways, strip cropping, vegetated buffers, riparian buffers, setbacks, terracing, and diversions.	Expectations of both plans are very similar.

Six Elements of a CNMP

1. Feed Management. Feed management activities are used to reduce the nutrient content of manure, which may result in less land required for manure spreading. While not a requirement, operators are encouraged to use feed management as part of their nutrient management strategy.

2. Manure and Wastewater Handling and Storage. This element deals with the components and activities associated with the structures and areas used for manure collection, waste water storage, and any area used to facilitate transfer of animal waste. In most situations, this element requires a combination of conservation practices and management activities. Conservation practices involved may include a waste storage facility, manure transfer, a waste treatment lagoon, or waste water treatment strips.

3. Nutrient Management. Nutrient management covers the land application of nutrients and organic by-products. Sources of nutrients and organic by-products are documented for each field. These sources may include animal manure, wastewater, commercial fertilizers, crop residue, nutrients derived from legumes, nutrients found in irrigation water, and mineralization.

Animal waste is a valuable product. Due to its high nutrient and organic content, it can be used as natural fertilizer.

Land application is the most common method of manure use because of the organic content of manure, the low cost, and the availability of land. Land application procedures must be planned and implemented to minimize any adverse impacts to surface and ground water.

Application rates for nutrients are based on the Montana NRCS nutrient budget for nitrogen, phosphorus, and potassium, and take both the source of nutrients and crop needs into consideration. Documentation required for the nutrient management element include planned crop rotations; realistic yield goals; current soil tests; manure and by-product nutrient concentration analysis; form, source, timing, and method of application by field; a description of application equipment; and the method used for calibration.

4. Land Treatment Practices. This element determines the right mix of conservation practices needed on the land where manure and organic by-products will be applied. On these fields, it is essential that runoff, leaching, and soil erosion be minimized to allow for plant uptake of the nutrients. An understanding of the present land use of these fields is essential when developing a conservation system to address uptake and movement of nutrients and pathogens.

An on-site visit is required to identify resource concerns and opportunities. The on-site visit will identify potential nitrogen and phosphorus losses from the site. At a minimum, the animal waste system must address potential water quality and soil erosion concerns. Conservation practices used may include:

- Conservation Crop Rotation
- Residue Management
- Contour Buffer Strips
- Diversion
- Filter Strip
- Grassed Waterway
- Contour Stripcropping
- Field Stripcropping
- Pest management
- Terraces
- Cover Crop
- Riparian Buffer

"In other states, they have bigger operations, more people and different terrain. With the wide open spaces around here, most farmers solve the problem before it arises. Why not stay ahead of it," said Eldon Krogstad, hog farmer near Plentywood.

Eldon Krogstad, who owns a hog operation 20 miles southwest of Plentywood, Mont., did not have enough manure storage. Summertime warm soils allowed Krogstad to spread the manure on his wheat fields whenever his underground pits filled, but during the winter he was forced to spread manure on frozen ground. The potential runoff into Malcolm Creek could turn into an environmental nightmare.

Taking a proactive approach to avoid this potential, Krogstad teamed with the NRCS to install a manure holding lagoon. He used Environmental Quality Incentives Program funds to cost-share the project.

5. Record Keeping. It is important to keep records to effectively document and demonstrate CNMP implementation activities. These records provide valuable benchmark information for the livestock operator that can be used to adjust the plan to better meet objectives and validate that federal and state regulations are being followed.

6. Other Manure and Wastewater Utilization Options. Using environmentally safe alternatives to land application can be an integral part of the overall CNMP, especially in areas where nutrient supply exceeds plant needs or available land is limited. Alternative uses may be energy production, methane production, composting, or pellet formation. Because the technology for alternative uses is relatively new, NRCS does not have standards and guidelines for all alternative uses.

NRCS Assistance

NRCS assistance will be available throughout the planning and implementation phases of any project, and follow-up assistance will ensure that necessary fine-tuning of the system is incorporated. Producers will no longer have to guess at determining whether crops or forage have the necessary fertility. A certified nutrient management plan is designed to provide a safe environment while meeting production goals.

NRCS has a number of conservation programs that offer technical and financial assistance. The 2007 Farm Bill significantly changed the Environmental Quality Incentives Program (EQIP) to help producers meet - or comply with - environmental regulation. As a result, EQIP is the principal program used by the agency to assist livestock operators in meeting environmental objectives in a voluntary manner, while maintaining or improving production.

Traditionally, NRCS has been the primary provider of conservation planning and other technical assistance to agricultural producers. However, in an effort to meet increased workload demands, NRCS has established a process for certifying Technical Service Providers (TSPs) who are also available to assist producers. To locate a TSP, visit the website http://techreg.usda.gov.

For more information or planning assistance, contact your local NRCS field office. You can also visit the NRCS website at http://www.mt.nrcs.usda.gov.

Definitions

Nonpoint source pollution means a source of pollution which originates from diffuse runoff, seepage, drainage, or infiltration. The source cannot be traced back to a definitive point, as opposed to point source pollution. For example, nonpoint source pollution may occur through runoff into watercourses from agricultural or urban sites.

A facility is an **Animal Feeding Operation (AFO)** if animals are confined for at least 45 days in a 12-month period and there's no vegetation in the confinement area during the normal growing season.

A facility is a **Confined Animal Feeding Operation (CAFO)** if it meets the definition of an AFO and is a small, medium, or large CAFO.

Small CAFO:

AFOs that don't confine enough animals to meet the medium size threshold may be designated as CAFOs by the permitting authority. An operation many be designated as a CAFO if the Montana Department of Environmental Quality or the Environmental Protection Agency determines through an onsite inspection that the facility is a significant contributor of pollutants to downstream state waters. Considerations in making this determination as to state waters and specific criteria impacting water quality are:

- A man-made ditch or pipe carries manure or wastewater from the operation to surface water; or,
- The animals come into contact with surface water running through the area where they're confined; or
- Size, location relative to water, means of conveyance, slope, and type of discharge.

No matter what size the operation is, if it is an AFO, it may be designated a CAFO. If the permitting authority inspects the operation and finds that it's adding pollutants to surface waters, a CAFO permit may be required.

The facility is a **Medium CAFO** if:
A man-made ditch or pipe carries manure or wastewater from the operation to surface water
OR the animals come into contact with surface water running through the area where they're confined
AND the operation has at least:
200 mature dairy cows
300 beef cattle or heifers
750 swine (each 55 lbs or more)
3,000 swine (each under 55 lbs)
9,000 chickens (liquid manure systems)
37,500 chickens except laying hens (not liquid manure systems)
25,000 laying hens (not liquid manure systems)
300 veal calves
150 horses
3,000 sheep or lambs
16,500 turkeys

A **Large CAFO** has at least:
700 mature dairy cows
1,000 beef cattle or heifers
2,500 swine (each 55 lbs or more)
10,000 swine (each under 55 lbs)
30,000 chickens (liquid manure systems)
125,000 chickens except laying hens (other than liquid manure systems)
82,000 laying hens (other than liquid manure systems)
1,000 veal calves
500 horses
10,000 sheep or lambs
55,000 turkeys