

Nutrient Management Planning for Livestock Operations: An Overview

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Introduction

Recent federal and state regulations mandate that livestock producers obtain nutrient management plans. Effective in 2004, operations which meet qualifications for a federal animal feeding operation (AFO) or a concentrated animal feeding operation (CAFO) must obtain a federal permit and must implement a nutrient management plan based on phosphorus rather than nitrogen.

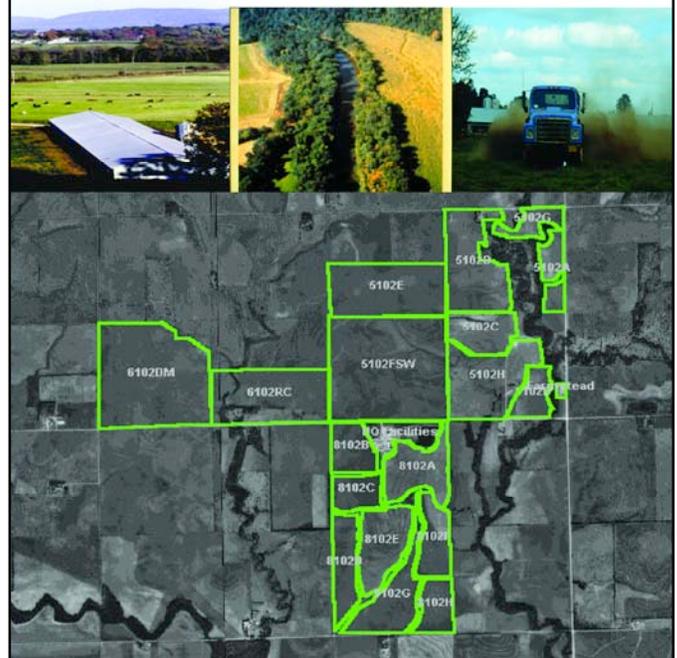
Effective in 2004, the State of Arkansas will implement new laws (Acts 1059, 1060 and 1061) that will require livestock operations in the nutrient-sensitive areas of Arkansas to obtain a nutrient management plan prepared by a state-certified planner. For many poultry operations that have voluntarily obtained nutrient management plans, they will now be mandatory. Voluntary plans will have to be updated to a phosphorus basis.

Since nutrient management planning is increasingly mandatory for livestock operations, this publication will define what a nutrient management plan is, discuss the need for and benefits of planning, discuss the legislation requiring plans and discuss how to obtain a plan.

Why Utilize Nutrient Management Plans on Livestock Operations?

Modern agricultural production relies on the addition of plant nutrients to cropland to ensure profitable production. Applying excessive nutrients beyond crop needs can reduce production efficiency as well as increase the potential for unfavorable impacts on surface and groundwater quality. Developing management strategies to determine fertilizer applications to best meet crop needs can be challenging. This is especially true when using animal manure as a fertilizer source (Figure 1).

Figure 1. Farming operations that utilize animal manure such as poultry litter as fertilizer for forages should obtain a nutrient management plan to guide their practices.



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Animal manures contain appreciable amounts of nitrogen (N), phosphorus (P) and potassium (K), all essential nutrients of plant growth. Plants require these nutrients in differing amounts. Unlike commercial fertilizers where the N-P-K ratio can be easily tailored to meet the crop needs, the N-P-K ratio in manures is not easily manipulated and can lead to over application of some nutrients and under application of others, depending on the application rate. Secondly, the plant nutrients in commercial fertilizer are readily soluble and available to plants, whereas a large proportion of nutrients in manure must undergo transformations dependent on weather, soil and other environmental factors before they are readily soluble and plant available.

This delayed availability of nutrients can be an advantage or disadvantage, depending on the timing of the crop's needs for nutrients. The lower solubility of nutrients in manure also means the nutrients are less likely to become soluble in runoff water than nutrients from commercial fertilizers.

These fundamental differences between commercial fertilizer and animal manures exemplify the difficulty in properly managing nutrients derived from animal manure in crop and forage production. This fact has contributed to increased environmental concerns over utilizing animal manures as fertilizer sources. Nutrient management planning is the most accepted practice to ensure that animal manures are properly applied to cropland while receiving as much benefit as possible from the manure.

What Is a Nutrient Management Plan?

Nutrient management is the act of making decisions about how nutrients are applied to meet crop requirements. It needs to consider many factors – the amount or rate of applied nutrients, the form (commercial fertilizer versus manure or other organic forms), timing and placement or application technique. All crop producers usually have some idea or plan for using plant nutrients on their farm. These plans historically have ranged from a “back of the envelope” calculation to more detailed formal plans prepared by agency professionals or certified planners.

Many state and federal regulations now require confined livestock operations to implement nutrient management plans. In addition, as discussed below, in some areas of the state, nutrient management plans will be required of landowners who apply any nutrients, whether manure or commercial fertilizers. These regulations require the plan to be a formal written document (usually in a specific format) prepared by individuals who have been certified by the state to prepare plans. This lends itself to record keeping of nutrient management practices. Thus, the defining

concept of a nutrient management plan is a formal document that presents the planned application of nutrients with an accompanying set of records that report when and where nutrients were applied.

Why Obtain a Nutrient Management Plan?

Nutrient management plans provide producers with many benefits and, in many cases, compliance with new state and federal regulations. Some benefits include:

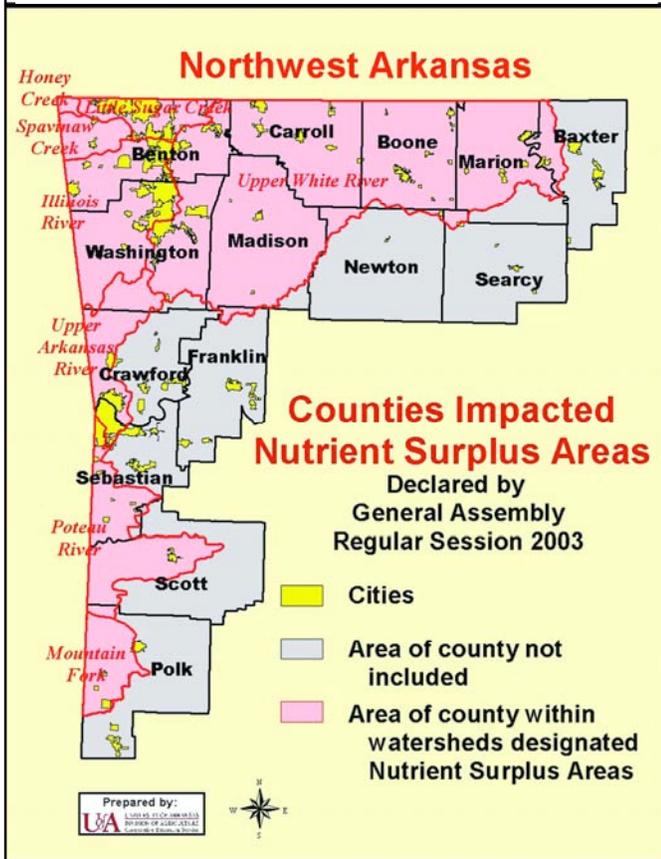
1. A complete inventory of available acreage, on-farm nutrients, crop nutrient needs, soil test information and fertilizer recommendations so that a nutrient budget can be tailored to each individual field while considering the whole farm.
2. A system for record keeping so that better informed management decisions can be made in the future.

Table 1. Animal requirements necessary for confined livestock operations to be considered a Concentrated Animal Feeding Operation (CAFO). A CAFO is required to obtain a permit from the Arkansas Department of Environmental Quality (ADEQ) to legally operate.

ANIMAL	NUMBER REQUIREMENTS*
Chickens other than laying hens (operations with other than a liquid manure handling system)	At least 125,000 chickens other than laying hens and does not use a liquid manure handling system
Chickens operating with a liquid manure handling system	At least 30,000 chickens and uses a liquid manure handling system
Cattle (other than mature dairy cows) grown in confinement	At least 1,000 cattle, dairy, heifers, cow/calf pairs, or veal calves
Swine (55 pounds or more)	At least 2,500 swine weighing 55 pounds or more
Swine (55 pounds or less)	At least 10,000 swine weighing 55 pounds or less
Horses	At least 500 horses
Sheep or lambs	At least 10,000 sheep or lambs
Turkeys	At least 55,000 turkeys
Laying hens (operations with other than a liquid manure handling system)	At least 82,000 laying hens and does not use a liquid manure handling system

* Confinement must be for 45 days (nonconsecutive) for any 12-month period.

Figure 2. Nutrient sensitive areas where State Acts 1059 and 1061 apply.



- The Federal Animal Feeding Operation (AFO/CAFO) Regulation – This Environmental Protection Agency regulation requires that all confined animal feeding operations of a given size (Table 1) must implement a nutrient management plan that meets EPA specifications, which are very similar to NRCS’s definition of a Comprehensive Nutrient Management Plan (CNMP – see section below).
- Arkansas Acts 1059 and 1061 – Effective in 2004, Act 1061 identifies nutrient-sensitive areas in the state (Figure 2), designates them as Nutrient Surplus Areas and requires that all nutrient applications (whether manure or commercial fertilizer or agricultural or residential) be done according to a nutrient management plan or an approved protective use rate. Act 1059 requires that nutrient management plans used in the nutrient surplus areas be written by certified planners. This act also requires that nutrients applied within the nutrient surplus areas be applied by certified nutrient applicators. For more details on these new laws, please contact your county extension office to obtain FSA29, *New Arkansas Laws Regulate Use and Management of Poultry Litter and Other Nutrients*, by H. L. Goodwin and others.

3. Recommended practices for ensuring production goals while protecting Arkansas’ streams and lakes.
4. A document specific to the farm that identifies what is planned to maintain production, protect the environment and comply with regulations and a set of accompanying records to demonstrate implementation of the plan.

When properly developed and implemented, nutrient management plans increase the likelihood of sustaining a profitable production system that minimizes negative impacts to the surrounding environment. It should also lessen the environmental liability against operations named in civil lawsuits.

Because nutrient management planning offers so many benefits, it has been adopted as a requirement in virtually all the state and federal environmental laws related to confined livestock operations in Arkansas. These include the following:

- Arkansas State Regulation 5 – This law requires that all livestock and poultry operations with liquid manure handling systems obtain a nutrient management plan as partial requirement of receiving a permit for operation.

There are two other situations in Arkansas that require nutrient management plans, although not by legislation. First, NRCS requires a CNMP for all operations that utilize animal manures as fertilizer for partial eligibility for federal financial incentive programs, such as the Environmental Quality Incentives Program (EQIP). Secondly, as a result of a lawsuit settlement, producers in the Eucha-Spavinaw watershed in Northwest Arkansas (Benton County) must obtain nutrient management plans.

What Is the Objective of Nutrient Management Planning?

The primary goal of a nutrient management plan is to make the best use of available nutrients and land resources for crop production while minimizing any adverse impact to the environment. An effective plan should meet the production goals of the producer while enabling the producer to be a good steward of the environment.

The specific objectives of a nutrient management plan are (1) to effectively determine nutrient needs for optimal and profitable crop production, (2) to properly utilize manure, commercial fertilizer or other nutrient sources in crop production and (3) to minimize nutrient losses from agriculture for the protection of water resources.

What Is a Comprehensive Nutrient Management Plan (CNMP)?

Recently the USDA Natural Resources Conservation Services (NRCS) initiated the development of Comprehensive Nutrient Management Plans (CNMP) for animal feed operations. A CNMP includes nutrient management, as defined above, but also utilizes other information such as manure and wastewater handling and storage and land treatment practices. Depending on the livestock operation, it may optionally include information on feed management and other less routine utilization activities. A key fundamental change incorporated into a CNMP is that manure application rates are based on phosphorus considerations rather than nitrogen considerations. A CNMP must be developed by NRCS or certified private technical service providers with appropriate NRCS certification.

How Do You Obtain a Nutrient Management Plan?

Nutrient management plans can be requested through your local conservation district office. This office will also provide assistance in applying for permits or financial assistance. If you have questions regarding this publication or regarding nutrient management planning, please contact your local county extension office.

What Are the Legal Implications of a Nutrient Management Plan?

If a nutrient management plan is required by law or a permit, it becomes a legal document that specifies how nutrients will be utilized. In addition, keeping records will be required. Ideally, the records will document that the plan is followed. In this case, crop production needs and environmental concerns are addressed while the plan and records provide legal protection.

If the plan is not properly implemented, the records will either document the plan was not followed or that the records were falsified to indicate

compliance to the plan. In both of these cases, there are significant financial and legal risks.

What Is the Producer's Responsibility?

To realize the maximum benefit of a nutrient management plan and obtain the legal protection it can provide, the landowner must take ownership of his plan and exercise his responsibility as the plan's decision maker. It is also his responsibility to assist certified plan writers in developing the plan by supplying information and future objectives of the operation. It is the plan writer's professional responsibility to use this information to provide management options for the landowner to select. The resulting nutrient management plan should meet the producer's needs and lend itself to record keeping so that proper implementation can be documented.

Summary

Nutrient management planning is a critical component for livestock farms. New state and federal regulations now require plans be obtained and implemented. Plans that are implemented correctly with corresponding records can help reduce a producer's risk of legal liability. While nutrient management planning is mandatory in many instances, it can also offer operational benefits, especially if the producer takes an active role in developing the plan with his certified planner.

References

Daniels, M. B., T. Daniel, D. Carman, R. Morgan, J. Langston, and K. VanDevender. *Soil Phosphorus Levels: Concerns and Recommendations*, FSA1029, 1999, University of Arkansas Cooperative Extension Service.

Goodwin, H. L., F. T. Jones, S. E. Watkins, and J. S. Hipp. *New Arkansas Laws Regulate Use and Management of Poultry Litter and Other Nutrients*, FSA29, 2003, University of Arkansas Cooperative Extension Service.

United States Environmental Protection Agency, *Producers' Compliance Guide for CAFOs*, November 2003, EPA 821-R-03-010.

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