Pest Management Practices for Beef and Dairy Production

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BEST MANAGEMENT PRACTICES FOR BEEF AND DAIRY PRODUCTION

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by

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Best Management Practices for Beef and Dairy Production

Introduction

Livestock farmers have long been concerned with waste management. Public concern about water quality, coupled with the passage of the Clean Water Act Amendments of 1972, have placed increased emphasis on methods to improve livestock waste management. (The 1972 Act and resulting programs are discussed more fully in "Best Management Practices in Agriculture and Forestry", Extension Publication 4WCB1, January 1980).

Water pollution resulting from most dairy and beef enterprises is classified as nonpoint source pollution. This pollution, unlike point source pollution, is usually the result of storm runoff or seepage into state waters.

Potential nonpoint source problems associated with beef and dairy production are outlined in this publication. Methods, "best management practices" (BMPs), are recommended to control or abate nonpoint source pollution. These practices are voluntary, common sense measures which many farm operators are already employing but which deserve a closer look by those unfamiliar with the methods suggested for conserving land and water.

How Cattle Affect Water Quality

Livestock operations may produce pollution through dust, odor, storm runoff, or percolation to the groundwater. This publication will examine only the possible impact of livestock on surface and subsurface water quality.

Surface runoff from a livestock operation or from the fields where wastes have been spread can carry organic matter, nutrients, or bacteria. Percolation to the groundwater table is most likely to contain nutrients, especially nitrogen and possibly disease-producing organisms. When organic matter enters a stream, it begins to decompose. This uses oxygen, reducing the dissolved oxygen in the water to a very low level. Under these low oxygen conditions fish may suffocate.

The nutrients in livestock wastes, mainly nitrogen and phosphorus, "enrich" the water, resulting in a rapid growth of algae. Phosphorus is thought to be the element most responsible for the rapid aging of lakes. High levels of nitrogen in the water could impair its quality for human or animal consumption.

Livestock wastes are a source of pathogenic organisms. The polluted water may spread diseases to humans or animals. Also pollution of water by livestock wastes could result in closing of the waters to fishing or shellfish harvest.

Types of Operations

There are two basic types of cattle operations: (1) *open grazing*, and (2) *confined.*

In *open grazing* or pasturing, the livestock density is at most only a few animals per acre. In confinement, large numbers of animals are restricted to a limited area such as a feedlot or dairy holding area.

With good pasture management, storm runoff of wastes from open grazing will not normally be a problem. If the livestock concentrate in or near a stream, however, considerable waste could enter the stream. Overgrazing or excessive livestock traffic will result in soil erosion and waste runoff. Improper location of supplemental feeding and livestock watering facilities are two practices which often result in soil and waste products washing into the stream. Even with open grazing, some concentration of stock may be essential and will produce problems similar to confined operations (Figure 1).

In *confinement*, the high density of animals and the large volume of wastes produce a potential pollution problem. Unless the area is under roof, runoff from the confinement area is a likely source of water pollution (Fig. 2 and 3). Also there is high potential for pollution of groundwater through seepage. The large volume of waste, the limited time for application to the land, and limited land area for disposal are other potential problems.

Figure 1. Dairy holding area denuded of cover and subject to erosion and runoff.

Figure 2. Runoff from this lot is polluting a nearby stream.

Figure 3. A large volume of waste could wash off of this feedlot and cause pollution if not adequately collected and disposed of.

Benefits of Waste Management

Managing waste to prevent water pollution and achieve improved water quality will have both public and private benefits. Improved water quality will result in longer life for lakes and reservoirs. Cleaner waters will make possible an increase in beneficial uses such as water supply and recreation. Fish populations should increase and there may be a greater diversity of species.

One benefit to livestock operators will be better use of nutrients from the animal waste. The organic materials will improve the physical characteristics of the soil. Good waste management should result in a decrease in purchases of commercial fertilizer. Good waste management will require increased effort and possibly capital investment, but will reduce the likelihood of lawsuits or fines which may result from pollution of the water by livestock wastes.

BMPs For Livestock Operations

The Agricultural Best Management Practices Handbook lists nineteen Animal Waste and Fertilizer Control BMPs. Many BMPs listed under Erosion and Sediment Control are also applicable. A detailed discussion of the individual BMPs will be left to the Handbook and other publications (see list at end). This publication discusses the general principles of Best Management Practices and their application to help the livestock operator decide which practices are best for him.

The Animal Waste and Fertilizer Control BMPs consist of management practices and those practices that require capital investment. To some extent, they may be interchangeable. For example, an operator might use solid manure handling while making improvements in timing and amount of manure applied. Or, he could elect to use a liquid manure handling system with soil injection. Most BMPs will require an increased level of management, hence, the final selection of BMPs may be based on the trade-off between increased management and additional investment required.

In open grazing, pasture land must be well managed to maintain a dense grass cover and prevent erosion and runoff (Figure 4). Any feature which concentrates livestock such as a watering site or supplemental shade should be located away from the stream (Figure 5). Special provisions may be required around watering sites to prevent erosion and to collect and safely dispose of wastes. Filter strips may prevent the waste from being washed into a stream. Where damage and erosion of stream banks or deposition of manure in the stream is a problem, fencing may be needed. Supplemental erosion control practices can be beneficial in good pasture management and in preventing wastes from running off the pasture.

Figure 4. A well managed pasture.

Figure 5. Water supply, well away from the stream will not result in pollution.

Site selection is the first step towards good waste management for a concentrated livestock activity. Ideally, the site should be near the top of a slope and as far from the stream as possible. The soil should be of a type which will reduce the possibility of wastes seeping to the ground water. Access to the facility and nearness to non-agricultural neighbors should also be considered.

When the location is not at the top of a slope, runoff water from the higher land may wash wastes from the area or produce problems in the waste storage and handling system. A diversion should be provided above the site to safely carry the "clean" water away. Water from the roofs of the buildings should be collected and conveyed away from the site. When liquid manure or lagoon systems are used, provisions to add roof water, as needed, into the system may be desirable.

Heavy rains wash animal wastes from the open lots even if outside water is safely diverted away. Collection channels, basins, filter strips or other techniques may be employed to collect, hold, or treat the runoff water (Figure 6).

Figure 6. Basin collects and holds feedlot runoff until properly disposed of.

The manure handling system may be solid, semi-solid or liquid. The needed facilities, design, construction and management of these systems is adequately described in other publications (see list of publications). The objective is to provide a system that will store or treat the wastes until they can be utilized. This system must prevent spills of wastes to surface waters or seepage to groundwater.

Utilization of animal wastes by application to agricultural land is the most common method of disposal. Liquid, solid or semi-solid wastes may be simply spread on the surface or may be spread and worked into the soil. In addition, liquid wastes may be injected into the soil or may be applied by irrigation. (Figures 7 and 8)

Figure 7. Spreading liquid waste on the surface.

Figure 8. Injecting liquid waste into the soil.

Regardless of the method of applying waste to the land, good management is needed to prevent pollution of ground or surface waters. Proper timing, location, and quantity of materials applied are means of reaching this objective. Commercial fertilizer may be added to provide the correct balance of nutrients. Applying wastes on snow, frozen ground, wet soils, steep slopes or near streams, or in large amounts will each increase the potential for water pollution. The nutrients in the material applied should not exceed the amount which will be removed by the crop. On sands and soils with low water and nutrient holding capacity, wastes may need to be applied in two or more applications.

While the Water Quality Management Planning Program (208 Planning) is a non-regulatory program, there are some instances where certificates are required by the State Water Control Board. A certificate is required for the construction of waste storage facilities. Also, if there is an actual or potential discharge of treated or untreated wastes from an operation, a no-discharge permit may be required.

In addition to the State requirements, there may be local regulations or zoning which applies.

The Producer Is the Key

The purpose of using best management practices for animal waste and fertilizer control is to utilize the resources of the farm operation while reducing the potential for water pollution. The livestock producer is the key to reaching this goal. His voluntary acceptance and use of these measures will contribute to a collective effort on the part of all farm operators to get the most benefit out of the land and animal wastes while preserving water quality.

How BMPs Are Selected

The selection of a system of BMPs for water quality improvement is specific to the individual operation. Other than for a solution to a specific problem such as inadequate storage, most waste management plans will combine several BMPs into the most practical system. Working with the owner or operator, the planner will review the problems, the present system, future plans, location, topography, soils and land area available for waste disposal. From this, a system of waste management will be developed which is suitable to the operation and will meet the water quality objectives.

Where Assistance Can Be Obtained

Many local, state and federal agencies are cooperating in providing assistance for the development and implementation of water quality improvement plans. The State Water Control Board has the overall responsibility for water quality improvement planning and implementation. The management of the agricultural portion of this plan has been delegated to the Virginia Soil and Water Conservation Commission with the Soil and Water Conservation District assuming leadership at the local level.

Information about water quality planning and techniques is available at the local office of the Cooperative Extension Service. Also the Soil and Water Conservation District and the Soil Conservation Service can provide information. There are many Extension and USDA publications which may be obtained from these offices.

Technical assistance for planning and implementation is available from the Soil Conservation Service through the local Soil and Water Conservation District.

Financial assistance to aid in the implementation of BMPs is available through several Federal programs. These are administered through the local Agricultural Stabilization and Conservation Service (ASCS) office.

Other Publications of Interest

Best Management Practices for Row Crop Agriculture, Extension Publication 4WCB3, June 1980.

Best Management Practices in Agriculture and Forestry, Extension Publication 4WCB1, January 1980.

Earthen Storage Basins for Manure, Extension Publication #805, September 1979.

Anaerobic Lagoons for Livestock and Poultry Wastes, Extension Publication #729, September 1979.

Use of Manures in Crop Production, MA-208, January 1977.

Solid and Semi-Solid Manure Handling Systems, ME-101, January 1977.

Methane Production from Livestock Wastes, Extension Publication #718, October 1976.

Environmental Quality Legal Guidelines for Virginia Livestock Producers, Extension Publication #707, June 1976.

Disposal of Dead Poultry and Other Farm Animals, Extension Publication #638, December 1974.

Liquid Manure Handling, Extension Publication #598, March 1974.

Some Questions and Answers Concerning Livestock and Poultry Waste Disposal, Extension Publication #521, September 1972.

TABLE 1

A partial list of BMPs* which may be used by Beef and Dairy Producers.

Conservation Cropping System
Grasses and Legumes in Rotation
Diversion
Filter Strips
Streambank Protection

Pasture and Hayland Management
Pasture and Hayland Planting
Planned Grazing Systems

Controlled Feed and Water Access
Fencing
Salt, Minerals and Feed Supplement Site Locations
Shade Areas
Planned Travelways

Water Supply Dispersal
With a Pipeline
By Spring Development
With a Trough or Tank
With a Well

Waste Management System
Elimination of Excess Runoff Water

Waste Storage Pond
Waste Storage Structure
Waste Treatment Lagoon
Piles, Open Stack Storage and Composting

Waste Utilization and Disposal
Land Absorption Areas
Waste Application Site Selection
Timing and Methods of Applcation of Animal Wastes

Transportation of Wastes
Disposal of Dead Animals and Poultry

Soil Testing and Plant Analysis
Proper Fertilizer Application
Slow Release Fertilizers

***Best Management Practices**