ALABAMA A&M AND AUBURN UNIVERSITIES

ALABAMA COOPERATIVE Extension SYSTEM

ANR-970

Best Management Practices to Handle Dairy Wastes

Dairy farmers recognize the importance of water quality; they accept the responsibility of managing their dairy wastes to protect, preserve, and even improve the quality of both surface and ground waters.

No single dairy waste management practice can meet the needs of every dairy nor is a single waste management practice appropriate or practical on all dairies in Alabama. Wise dairy operators realize that the best answer to their situation will be a combination of waste management practices. Such dairy operators can seek input from several sources. Extension dairy production and waste management specialists and waste management and water quality specialists from NRCS and other agricultural agencies can help operators establish the best waste management system for their dairy.

This publication briefly describes various animal waste management practices. When properly applied to specific dairy situations, these activities become "best management practices" that help dairy operators:

- Prevent direct discharge of manure or wastewater into surface waters or onto adjacent neighbors' property.
- Prevent any nuisance conditions that interfere with normal use and enjoyment of neighbors' property.
- Enhance the operational efficiency of the dairy unit.
- Collect and use dairy manure and wastewater for beneficial purposes such as fertilizer, compost, or bedding.

Dairy operators in Alabama can use one or more of the following dairy waste management techniques to reach the goals stated above.

Holding Pond for Milking Center Wastes

Dairy wastes associated with the milking center are liquid and are easily collected in a holding pond close to the milking center. This holding pond can also collect liquid wastes and runoff from holding areas. The pond should be sized to hold this liquid waste plus any rainfall that occurs between pond pump-out intervals.

Runoff Management

Noncattle open areas around the dairy milking center or dairy barn facility should be sloped to direct freshwater runoff away from cattle areas and manure collection structures unless additional water is needed for irrigation. Unless sized for this additional runoff, ponds and lagoons will fill and require pumping out quicker than expected. For wastewater irrigation, all runoff can be directed into either the milking center holding pond, waste storage pond, or lagoon system. This allows for land application with other collected dairy waste. Roof guttering is one way of collecting roof runoff and controlling where it goes, either away from or into the waste stream as desired.

Scrape and Haul

This system uses a scraping operation to remove solid manure from holding areas and even some freestall barns to a special manure holding area to await hauling for land application. This special manure holding area should have an impervious base such as compacted clay, but concrete is preferable. This impervious base should be sloped to drain liquid manure away into a waste storage pond that also handles milking center liquid wastes. Storage areas may also be covered to reduce rainfall runoff into the system. This method of dairy waste management is very basic and is generally most applicable for dairy herds with less than 100 cows. In some instances, the manure hauling and land application interval could be daily, but more than likely it will be weekly or monthly.

Waste Storage Pond

A dairy waste storage pond is a specially constructed pond used to collect and store manure, flush water, and polluted runoff from a dairy facility. Storage is a relatively short period of 90 to 180 days. Waste storage pond contents must be removed at the end of this storage period with land application the most common end use. The waste storage pond must be constructed with an impermeable liner to prevent waste leakage to ground water. Because waste storage ponds produce an odor, they should be located downwind of neighbors, highways, and any public use area. Storage pond waste retains most of its fertilizer nutrients. As a result, at a land application rate of 200 pounds of nitrogen per acre, more than two and one-half times as much cropland will be needed for land application of waste from a storage pond system than from a two-stage lagoon system for the same number of dairy cows (See Extension publication ANR-954, "Selecting, Planning, and Managing Dairy Waste Storage Ponds").

Dairy Waste Lagoon

Dairy waste lagoons are earthen structures designed for biological treatment and long-term storage of

dairy waste. Lagoons are specially constructed to prevent leakage of dairy waste to ground water. The lagoon system allows manure to be handled with water-flushing systems, sewer lines, pumps, and irrigation equipment. The natural biological action on the waste results in less odor during land application. Nitrogen content of the waste is reduced in lagoons by as much as 80 percent. This reduction minimizes land area needed for land application and enhances long-term storage (See Extension publication ANR-963, "Planning and Management of Dairy Waste Treatment Lagoons").

Waste Storage Pond Agitation and Lagoon Renovation

Agitation prior to and during both waste storage pond pumpout and lagoon renovation is necessary to suspend waste solids that have settled to the bottom or floated to the surface. This agitation will be by either a portable propeller-type pump or a chopper-type pump requiring at least a 100-horsepower tractor. Agitation should thoroughly mix the solid and liquid contents to allow removal of both during the pump-out process (See Extension publication ANR-953, "Renovating Livestock Lagoons Using Irrigation").

Solid/Liquid Separation for Dairy Waste

Twelve to 14 percent of excreted dairy manure is solids. This, along with any solid bedding material used in freestall housing, will reduce storage pond or lagoon capacity. Even after biological treatment, the lagoon will be quickly filled. These accumulated solids also greatly reduce lagoon efficiency. Solid-liquid separation using either settling basins or mechanical separators (stationary screens or elevators) can reduce up to half of the solids in the waste stream and should be considered even when no bedding is used. These solids can then be used for fertilizer, bedding, feed, or composting. If used, separators can increase the capacity of storage ponds and waste lagoons.

Land Application

Land application is the best end use of dairy manure collected regardless of the handling method. Solids are applied with manure spreaders, and liquid contents of storage ponds and dairy lagoons are land applied through irrigation. Land application should match fertilizer requirements of the target crop with plant-available nutrients in the waste. Matching crop fertilizer requirements minimizes harmful effects to water quality that can occur through runoff into surface water or deep percolation into ground water. It also reduces the risk of water pollution from manure application to the same level as manufactured fertilizer application. Timing of applications and soil incorporation should also be considered.

Waste Testing

Proper land application of waste requires nutrient content of the waste to be analyzed or estimated. While laboratory analysis of lagoon wastewater and agitated lagoon slurry is available, a 3- to 10-day time lag between sampling and receiving analysis results is typical. Field tests for plant-available nitrogen are available to allow on-site wastewater and dairy slurry testing during the land application process. This allows calibration of the land application process to provide the proper rate of nutrient application for a crop (See Extension publication ANR-973, "Field Testing Manure Slurries and Wastewater").

Soil Testing

Prior to land application of dairy wastewater or slurry waste, the target field intended for waste application should be soil tested. Soil testing tells dairy operators how much fertilizer is required for the crop and allows them to match the dairy waste/wastewater application to meet these crop fertilizer requirements.

Wastewater Irrigation

Although tractor-pulled tanks with injection of wastes are available, they are not practical for dairies in Alabama. Using regular agricultural irrigation pumps and either traveling guns or solid set or center pivot irrigation equipment to land apply dairy wastewater (liquid with less than 2 percent solids content) is the best way to handle large volumes of liquid wastes generated by a freestall flush system. Irrigation equipment should be calibrated to match crop fertilizer requirements (See Extension publication ANR-925, "Calibrating Traveling Guns for Slurry Irrigation").

Stream Exclusion

In those pasture areas where dairy animals have access to flowing streams, steps should be taken to minimize cattle loitering in the stream. Heavy or high-use access could cause stream bank erosion or destruction of stream side vegetation and water quality reduction due to manure deposits. Stream shade removal, fences, and other barriers may be used to protect the quality of streams flowing through these pastures.

Rotational Grazing

Dividing pastureland, either rainfed or irrigated, into small areas for controlled daily grazing allows opportunity for greater per feed unit milk production through intensive pasture management for grazing. Direct land application of dairy waste and wastewater promotes grass production and easier manure handling.

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