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Waste management: regulations and problems in Kansas

Abstract

The dairy industry is receiving greater pressure to reduce its potential pollution to the environment. As the demand grows for cleaner streams, dairy operations will need to reduce and control the nutrient and sediment loading of the runoff leaving the farm vicinity. Existing dairy operations will need to evaluate the impact of manure storage and management on the environment. Costs of controlling the runoff must be weighed against new lot construction in an alternate location. Future dairy facilities will need to address current regulations and be designed for compliance with future and more stringent regulations.; Dairy Day, 1992, Kansas State University, Manhattan, KS, 1992;

Keywords

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WASTE MANAGEMENT: REGULATIONS AND PROBLEMS IN KANSAS

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Summary

The dairy industry is receiving greater pressure to reduce its potential pollution to the environment. As the demand grows for cleaner streams, dairy operations will need to reduce and control the nutrient and sediment loading of the runoff leaving the farm vicinity. Existing dairy operations will need to evaluate the impact of manure storage and management on the environment. Costs of controlling the runoff must be weighed against new lot construction in an alternate location. Future dairy facilities will need to address current regulations and be designed for compliance with future and more stringent regulations.

(Key Words: Waste Management, Kansas Regulations, Manure Production.)

Overview of Manure Production in Kansas Dairy Herds

The Kansas dairy industry includes 98,000 milk cows. A 1,400 lb cow produces 115 lbs of manure/day. Over 5,635 tons/day and over 2 million tons/yr of manure are produced by dairy cows in Kansas. Storm water runoff from dirt lots and concrete slabs on dairy farms is estimated at 400 acre-ft of water/yr. Without proper control structures, the storm water runoff transfers the nutrients to streams or neighboring property. The volume of wash water from milk parlors is over 550 acre-ft of water/yr. Additional manure production and runoff result from the replacement heifer lots. The manure from one cow is equal to that from 16 people. On a daily basis, the dairy industry

in Kansas is responsible for handling sewage or manure equivalent to that from a population of 1.5 million people, or about 60% of the population in Kansas.

Annual manure production from Kansas dairy cows contains approximately 10,200 tons of nitrogen (N), 4,150 tons of potassium (K), and 8,200 tons of phosphorus (P). Fifty percent of the N is lost to the soil through leaching or to the air as ammonia. The remaining N, 5,100 tons, is available for utilization on cropland or pasture. If the manure is not properly stored and applied to land, then the N leaves the property in the storm runoff. The K and P will not break down as quickly as the N and will remain in the solid portion of the manure. About 30% of the K and P can be lost by runoff and leaching.

The N available for land application is equal to about 1/3 of 1% of the total fertilizer used in Kansas. Conservatively, its value is \$1 million or about \$10 per cow. Although the return economic value per cow for handling the manure may seem low, proper management and control of the runoff from the vicinity can help avoid nuisance complaints, lawsuits, or environmental problems such as fish kill or groundwater contamination. The cost of controlling problems is relatively small compared to the cost of correcting a problem at a later date. Later correction not only includes the cost of developing proper waste handling facilities and management practices, but may also include cost of cleaning up damage to the environment.

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Research has found that runoff from beef cattle feedlots has a biochemical oxygen demand (BOD₅) eight times the concentration found in raw domestic sewage. Increased levels of BOD₅ result in oxygen being depleted in waterways and potential fish kill. Feedlot runoff can contain 100 times more N and P than runoff from grazing land. Similar results would be expected from lots utilized in the dairy industry.

Current Kansas regulations relate to confined livestock facilities and not to livestock maintained on pastures. The amounts of nutrients transported from grazed pasture land range from 0.5 to 8.7 lb for N/acre/yr and 0.04 to 4.1 lb for P/acre/yr. Nutrient levels in runoff from livestock pastures often do not exceed those in runoff from ungrazed pasture, forest, or dryland farms. Overgrazed pastures have higher nutrient runoff than properly managed pasture. Unconfined livestock may decrease vegetative cover and increase runoff, erosion, transport of sediment, plant nutrients, and oxygen demand. This is particularly true in high impact feeding and watering sites. Bunks in a pasture should be at least 200 feet from the nearest stream. Improvements can also be made at watering sites to minimize the stream bank erosion and pollution problems.

Kansas Regulatory Agency

Kansas Department of Health and Environment (KDHE) is responsible for administering Kansas regulations related to runoff from confined livestock facilities and other agricultural waste-control facilities. The Kansas regulations became effective on July 1, 1967. The laws are designed to minimize the pollution or nutrients leaving the vicinity of a confined feeding operation, such as a dairy operation, with everyday manure production and normal rainfall or intensive storms. Each year, KDHE collects over 1,500 surface water samples, 150 groundwater samples, and 60 fish tissue samples to monitor the quality of water in Kansas.

Present Kansas Laws

KDHE administers the registration permit and certification requirements for dairy facilities in Kansas. The Kansas regulations require any operation with 300 head or more of livestock in confinement to be registered. Operations located so no potential problems are created by the runoff from dirt or concrete lots and manure stacks or leaching into groundwater are issued a certificate of operation rather than a permit. Normally, a permit will require the construction and maintenance of some type of waste management control system and a plan for utilizing the nutrients. In Kansas, 2,664 livestock operations are registered, and 1,031 operations are certified.

Runoff from a dairy operation is no longer under the operator's control once it leaves the property or enters a stream. Dairy producers need to be concerned about the shortest distance from a manure stack, freestall barn, dirt lot, or concrete feeding slab to either the property line or the stream, NOT just the distance to the nearest stream. The soil type and depth of groundwater must also be considered. The runoff must meet the following conditions:

1. The water cannot be acutely toxic to aquatic life, wildlife, plants, livestock, or humans;
2. The water cannot be a health hazard to humans who come in contact with it;
3. The water must not cause water quality standard violations in any "classified" streams or lakes;
4. The water must be of a quality that will not degrade any groundwater it might recharge.

Who Needs a Permit?

Confined feeding is defined as confinement of animals in lots or pens that are not normally used for raising crops and have no presence of vegetation. Confined feeding facilities can be

located indoors (freestall barns) or outdoors (dirt lots). Even if dairy cows remain in a freestall barn without access to dirt lots, the operation is still considered to be confined feeding. Operators need to be registered if any one of the following criteria are met:

1. The operation has a capacity of 300 or more head of beef cattle, dairy cows, hogs, or sheep or a combination of all four;
2. The operation, irrespective of size, utilizes wastewater control facilities such as manure pits, ponds, or lagoons;
3. The operation is located near a stream or other aspects of the operation, such as improper disposal of dead animals present a potential water pollution problem; and
4. The operator(s) elects to come under the regulations.

Dairy producers should recognize that the 300-head capacity applies only to the livestock kept in confinement. Livestock that are maintained on pastures or crop stubble are not included. The total capacity is number of cows plus other confined fed livestock, such as the number of head in a beef backgrounding operation. The regulations do not allow for adjustments based on animal weight, age, or type. Weight or size will influence the size of the system needed to handle the manure. The Kansas laws do not have a minimum number of days in confinement before registration is required. In Kansas, if more than 300 head of livestock are held in confinement for 1 day, then registration is legally required.

Most Kansas dairy operations are less than 300 cows, with an average of 70 cows per farm. However, the regulations apply to these operations, because any runoff control, manure storage, or wash water structures are required to be registered, regardless of herd size. The present laws require most dairies to be registered because of the regulations for manure and wash water control structures.

State and Federal Guidelines?

Dairies having between 300 and 750 cows are required to follow the regulations established for Kansas and directed through KDHE's Division of Environment. However, if a dairy has less than 300 head and is considered to have pollution potential, it can still be required by KDHE to come under compliance with the existing laws. Operations with 750 or more cows are required to meet the regulation established by the Environmental Protection Agency (EPA). EPA guidelines basically apply to operations with over 1 million lb of livestock confinement/day. When the larger operations meet EPA requirements, they are issued a National Pollutant Discharge Elimination System (NPDES) permit. Presently, 296 livestock operations in Kansas have NPDES permits.

Discharging and Nondischarging Systems

The regulations for dairy operations between 300 and 750 cows allow for either discharging or nondischarging systems, depending on the size of operation and location of lots in relationship to waterways and potential problems. A discharging system separates the solids from the liquid by using settling basins, terraces, grass filter strips, sedimentation structures, or mechanical separators. After separation, the water is then discharged into a grassed waterway, pasture, or cropped field. No mechanical pumping is required with discharging control systems. A nondischarging system may include a method for separating the liquid and the solids, but the liquid portion of the runoff is contained in a structure. Normally, the pond is later pumped, and the water is dispersed onto cropland or pasture.

Any water draining from adjacent fields through a lot must be controlled using either a discharging or nondischarging pollution control system. Therefore, it is important to divert runoff from cropland or pasture around the lots using terraces or channels. In some cases, it may be easier to relocate the lots rather than control the excess runoff. For new operations,

lots should be located on upland rather than bottomland to minimize the drainage and potential pollution problems.

Production units with a capacity of 750 or more cows are required to contain all runoff from lots in a holding pond, where there is little or no breakdown of the solids prior to dispersing onto cropland. The function of a holding pond is to contain the runoff from a lot until the nutrients are dispersed on farmland.

An operation with capacity of less than 300 head may require registration if it has pollution potential, a complaint is issued by a neighbor, or a pond is used to contain the runoff or wash water. Smaller operators are not allowed to have dirt or concrete lots straddling, adjoining, or draining into a road ditch, creek, or other channels without adequate control, because of the pollution potential. In addition, streams or waterways should not run through dirt lots. A water tank and pump system should be used for watering the cows.

Operations with less than 300 cows should maintain a distance between property lines or streams and the lots of at least 150 ft. KDHE requires a release form to be signed by any neighbors living within a quarter of a mile of a dairy operation with 30 or more cows, if the operation is registered. The release form does not prevent neighbors from issuing complaints, should mismanagement occur.

Kansas laws allow for maximum flexibility for dairy operators to choose the type of waste management control facility. Options available include: holding ponds, lagoons, sedimentation structures, terraces, waterways, infiltration ponds, evaporation ponds, or concrete storage structures. With each of the systems, certain restrictions will apply and design specifications have to be met. Some of the criteria are:

1. Lots and runoff control facilities cannot be within 100 feet of the property line;
2. Water pollution control facilities must be able to handle the runoff generated by a 24-

hr rainfall equal to 10-yr or 25-yr averages, which is about 5" in western Kansas, 6" in central Kansas, and 7" in eastern Kansas;

3. Lowest elevation of the feeding area or waste control facilities must a minimum of 10 ft above groundwater aquifers or seasonal perched tables;
4. The lots must be located a minimum of 100 ft from wells or reservoirs (preferably downslope of water sources) and 50 ft from rural water district lines;
5. Sedimentation structures are needed, with the type being dependent upon the drainage area;
6. If a holding pond or lagoon is used, then provisions for pumping the water, including certain land requirements and pumping equipment, must be available;
7. Release forms must be signed by neighbors within a certain distance of operations; and
8. A plan must be developed for utilizing the nutrients contained in the runoff.

Holding ponds and lagoons must be pumped down in 120 hr, if a nondischarging system is constructed. Often, irrigation equipment is more feasible and practical than tank wagons. An acre-ft of water (43,560 cu ft or 1,600 cu yd) contains 325,828 gallons of water. A 3,000 gallon tank wagon would have to make 108 trips to haul an acre-ft of water. A 300-gallon/min irrigation pump would be able to pump an acre-ft of water in 18 hr. Therefore, during the design stage, an operator needs to consider how a pond is going to be pumped. Additional details are also provided for pumping regulations, fencing, maintenance, and inspection in KDHE design standards.

A crop consultant should be considered in developing a nutrient utilization plan for applying the water onto farmland. KDHE limits the application rates to 3 acre-in/acre/day and 6 to 12 acre-in/acre/yr. The water in a pond should

be sampled and tested for nutrient levels prior to application. Annual soil sampling in the application areas should be done to monitor the levels of N, K, or P in the soil. Fertilizer and other nutrients should then be applied according to the crop's needs.

Conclusions

The type of actual system that may receive approval by KDHE is dependent upon the site, drainage area, proximity of the streams or groundwater, number of cows, etc. Because of the variability between dairies, it is difficult to

state exactly what will work in all situations. However, dairy producers should not locate new or expand existing facilities near streams or running water or in areas such as a ravines, where cropland or pasture may drain through the lots. Existing dairy operations will need to evaluate the impact of the manure storage and management on the environment. Costs of controlling the runoff must be weighed against new lot construction in an alternate location. Future dairy facilities will need to address and be designed for compliance with future and more stringent regulations.