Rethinking Regulation of Animal Agriculture

by

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A number of events in 1997 and 1998 signaled a turning point in the U.S. Environmental Protection Agency's regulatory posture toward pollution from animal agriculture. During the summer and early fall of 1997, calls for governmental action on pollution from animal agriculture climaxed when thousands of diseased and dying fish were found in waters of both North Carolina and the Chesapeake Bay. Scientists attributed these fish kills to outbreaks of the toxic microbe *Pfiesteria piscicida*, thought to be caused by nutrients in runoff from overapplication of animal waste. Other less dramatic problems around the country (contamination of drinking water, ammonia emissions, and nuisance odors) have contributed to an increasing level of concern about animal agriculture. Proposals for new legislation and regulation, at both the state and federal levels (S. 1323 The Animal Agriculture Reform Act and H.R. 3232 The Farm Sustainability and Animal Feedlot Enforcement Act) address health and environmental effects from livestock production.

Under the statutory authority of the Clean Water Act, the U.S. Environmental Protection Agency (EPA) has regulated water pollution associated with animal agriculture since 1976. However, recent problems with animal agriculture demonstrate that existing regulations and voluntary measures do not adequately prevent environmental damage. In October 1997, Vice President Gore called upon the Environmental Protection Agency (EPA) and other federal agencies to develop a Clean Water Action Plan (CWAP) that would coordinate federal efforts for protecting the nation's water quality. The CWAP, officially released in February 1998, identifies polluted runoff as one of the important remaining sources of water pollution. It directs EPA and the U.S. Department of Agriculture (USDA) to develop a unified strategy for minimizing the water quality and public health impacts of animal agriculture. In March 1998, EPA released a draft version of its internal strategy for revising regulation of animal feeding operations. At the same time, it also released its final *Compliance Assurance Implementation Plan for Confined Animal Feeding Operations*. As called for by the CWAP, EPA and USDA jointly released their draft *Unified National Strategy on Animal Feeding Operations* in September 1998.

Which farms and which aspects of the production or waste disposal process should be regulated? How does heterogeneity across species, geographical conditions, and production processes influence waste problems? What methods or incentives can best achieve stated goals? Who should pay? In this article, we review EPA's existing regulations and consider these questions.

EPA's existing regulations

EPA derives its authority to regulate pollution from animal agricultural operations from specific portions of the Clean Water Act (CWA). The CWA (§301(a) and 40 CFR 122) broadly prohibits "the discharge of any pollutant" by any point source to "Waters of the United States" without a permit from the National Pollutant Discharge Elimination System (NPDES). A point source is "any discernable, confined, and discrete conveyance... from which pollutants are or may be discharged" (§502 (14) and 40 CFR 122.2), and includes "confined animal feeding operations" (40 CFR Section 122.23 and 40 CFR Part 122, Appendix B). The CWA specifically excludes, however, return flows from irrigated agriculture or agricultural storm water runoff.

EPA regulations define an animal feeding operation as a facility that must (1) stable, confine, and feed or maintain animals for a total of forty-five

days or more in any twelve-month period; and (2) not sustain crops, vegetation forage growth, or post-harvest residues in the normal growing season over any portion of the facility. An animal feeding operation is designated a "confined animal feeding operation" (CAFO) if it has more than 1,000 animal units (equivalent to 1,000 feeder cattle) or has between 301–1,000 animal units and either discharges pollutants into navigable waters through a man-made conveyance system or discharges directly into navigable waters that originate outside of the facility and pass over, across, or through the facility, or that come into direct contact with the confined animals. However, if an animal feeding operation only discharges pollutants during a twenty-five-year, twenty-four-hour or larger storm event, it is not a CAFO as defined above. An animal feeding operation of any size may also be specifically designated as a CAFO if the permitting authority determines it to be a source of impairment on an individual case-by-case basis.

A CAFO must obtain an NPDES permit which specifies the amount and character of permitted wastewater discharges. For CAFOs with over 1,000 animal units, the permit requirements are based on EPA's 1974 Effluent Limitations Guidelines for Feedlots (40 CFR Part 412). Effluent guidelines are performance standards on wastewater treatment levels that are technically and economically achievable for a given industry. Currently, the effluent limitation for CAFOs (with the exception of the duck subcategories) does not allow any discharge except under chronic or catastrophic rainfall events that cause overflow from a facility designed to contain both wastewater and runoff from a twenty-five-year, twenty-four-hour rainfall event. The twenty-five-year, twenty-four-hour storm rule was based on the level of control provided by technologies in place in 1974 and which was determined to be the highest practicable level of control at that time. For those CAFOs under 1,000 animal units, permit requirements are based on the permit writer's best professional judgment.

Land application

Land application of manure can lead to high levels of nutrients in runoff and leaching, and to subsequent contamination of surface and groundwater. In surface water, nutrients can cause excessive algae growth, possibly leading to fish kills and other ecological changes in water bodies. High levels of nitrates in drinking water can cause methemoglobinemia, which can be fatal to infants. The existing regulations do not provide much explicit guidance on land application. One exception is the general CAFO permit proposed by EPA Region 6 (AR, LA, NM, OK, TX) which requires that application not exceed the agronomic rates needed by crops.

Regulatory authority over land application was debated in the case of *Concerned Area Residents for the Environment* v. *Southview Farm* (1992, 2d. Cir.). Southview Farm, a dairy in western New York, was charged with violating the CWA by overapplying liquid manure to its fields. The court ruled that although liquid manure runoff from the farm might be initially considered diffuse, as it left the farm, it collected in such a manner as to effectively become a point source. It also found that the runoff was primarily the result of the overapplication of manure, not the result of precipitation, as excluded by the agricultural stormwater exemption. The Southview Farm case highlights the importance of addressing land application in revised EPA regulations. Currently, federal regulations do not clearly specify requirements for land application (such as ptocedures for determining appropriate application rates or whether overapplication constitutes a point source discharge). Requirements for land application by CAFOs, however, can be included in any permit based on the permit writer's best professional judgment. As a result, permit requirements for land application vary from state to state and from permit to permit. Furthermore, land application by other animal feeding operations not meeting the CAFO definition and by other farms obtaining manure from CAFOs are not currently subject to regulation.

Nutrient management plans that incorporate testing of soil and manure for nutrient levels can help determine the correct agronomic rate of combined fertilizer and manure application. Without such testing, there is a tendency to underestimate the value of nutrients in manure, as well as soil nutrient levels and nutrient inputs from legume crops, leading to overapplication of manure and fertilizer. Should nutrient management plans that specify the correct application rates be required for all NPDES permits? If so, should levels of application above crop requirements then be considered point source discharges?

If EPA wants nutrient management plans, it should decide which nutrients must be managed. Currently, most nutrient management plans focus on nitrogen. Farmers often apply manure at rates according to crop N requirements—a practice which often results in phosphorus levels in excess of crop needs (Sharpley). In many water bodies near large numbers of livestock, such as in the Upper Bosque watershed of Texas, phosphorus is the main source of impairment. In fact, phosphorus impairs almost all freshwater bodies, regardless of the source of the nutrient. Estuarine waters, on the other hand, tend to be impaired from nitrogen. Good management, therefore, should include testing manure and soil

for both N and P. A phosphorus standard, however, must consider acreage available. Managing for phosphorus generally requires greater acreage than managing for nitrogen. Additional land purchases may be costly, complicated by the permit process and by opposition from neighbors, or it may be that there is simply not enough available land nearby (Pratt, Jones, and Jones).

Good management should not be limited to soil and manure testing, however, but should also include such things as realistic yield goals (which affect fertilizer plans), proper timing of manure and fertilizer applications, and erosion control. Other activities besides land application may facilitate the disposal of excess waste. The regulatory process itself may provide the incentive for producers to use other options, such as utilizing waste as an energy source or composting. Researchers are investigating the feeding regimes to reduce the nutrient content of manure.

The EPA-USDA draft Unified National Strategy proposes that all animal feeding operations develop a comprehensive nutrient management plan that includes land-application management. Both H.R. 3232 and S. 1323, as well as Maryland's recently passed *Water Quality Improvement Act of 1998* (S.B.178) include provisions requiring nutrient management plans. In Maryland, these plans will require combined fertilizer and manure application to be based on both phosphorus and nitrogen. Both S. 1323 and H.R. 3232 would prohibit applications of nitrogen and phosphorus above crop nutrient needs. Under S. 1323, any excess liquid manure must be put to another beneficial use or treated under wastewater standards. H.R. 3232 would make any application above agronomic rates a point source discharge.

Protecting groundwater

By definition, *Waters of the United States*, must be navigable and consequently the CWA does not regulate groundwater contamination. But as mentioned previously, nitrate contamination of groundwater causes health concerns, and groundwater aquifers often connect hydrologically to surface waters. The Safe Drinking Water Act (SDWA § 1421 and §1452) does, however, enable EPA to protect drinking water sources. EPA attempts to protect groundwater through requirements about the permeability of waste containment structures whenever EPA assumes that there is a hydrologic connection between groundwater and surface water. The Region 6 General Permit requires permit holders to meet strict performance standards for lagoons or the use of holding tanks, unless it can be demonstrated that underlying groundwater and the waters of the U.S. have no connection. Should this "rebuttable presumption approach" be made applicable nationwide?

Heterogeneity across locations

When it comes to regulation of animal agriculture, one size definitely does not fit all. Geographic heterogeneity influences pollution problems stemming from animal agriculture. Soil type, climate, and topography can cause considerable variability in both problems and available management practices. The types of farm enterprise found in a watershed, including their degree of vertical integration, scale of operation, and the proximity to cropland and pasture, also vary geographically and affect the use and profitability of alternative waste management practices.

In some areas, availability of cropland and topography less vulnerable to runoff make land application on-site the preferred method of disposal, as in the heart of the Corn Belt (Fleming, Babcock, and Wang). In other areas, especially those with large numbers of livestock operations or highly concentrated feeding operations, a scarcity of nearby land, such as in Erath County, Texas, and in some parts of North Carolina, may preclude onsite disposal. This problem may become even more severe under more stringent land application requirements, as with a phosphorus standard. A possible solution would transport excess manure off CAFOs with inadequate cropland for use in other areas. In Erath County, home to a large number of dairies, composting manure in a centralized facility and then

transferring it out of the area may effectively reduce contamination of surface water. Transport off-farm, however, raises the question of accountability once the waste leaves the farm. Should receiving farms that apply raw manure or compost be required to have nutrient management plans? Currently, federal regulations do not regulate any manure spreading operations other than those onsite at CAFOs, but H.R. 3232 proposes regulation of receiving farms.

Disposal of excess waste is only one of the regulatory questions affected by geographic heterogeneity. Should regulations be implemented independent of location, but specific to the type of livestock operation? Should the allowable level of discharge vary with location, and if so, how? In this regard, watershed-based management, as emphasized in the CWAP, can be an effective means of framing the questions and finding solutions. Different watersheds are not all affected by the same levels or types of pollutants. In Florida, for example, phosphorus is the main problem in the Okeechobee area, but nitrates concern residents in the northern part of the state (Thurow and Holt). From a watershed-based perspective, it is the amount and type of pollution generated, and the assimilation capacity of the watershed, that matter. This being the case, should regulation be on an individual farm basis (numbers and types of animals per farm for example), or should regulation be based on the entire population of animals permissible within a watershed, or perhaps on all nutrient sources within the watershed?

In theory, under the latter scenario, regulators might determine total allowable discharge limits for a watershed and then regulate individual farm's contributions to that watershed's total discharge limit. Management plans could then be tailored to meet the individual needs and conditions of each watershed, with animal numbers and discharge concentrations varying as appropriate. EPA's Total Maximum Daily Load (TMDL) Program can be an effective tool for this approach. The TMDL program sets water quality-based standards for individual waterbodies or whole watersheds. EPA is also currently developing region-specific, waterbody-based technical guidance on nutrient criteria. The social significance of any absolute level of water quality improvement will depend on the designated use of the waterbody, its ecological significance, and proximity to population. Other things being equal, different levels of social benefits seem to imply different permissible discharge levels. In practice, however, this theoretical solution of measuring farm-level contributions to water contamination may be too data intensive to be attainable and raises the basic conundrum of how to measure diffuse nutrient discharge from land application. Perhaps the best we can do is to vary regulations at the watershed, state, or regional level.

Heterogeneity seems to imply that national standards will impede economic efficiency. Watershed or state standards are likely to be too information intensive to be set in Washington. The delegation of standard-setting to states or watershed bodies could, however, invite political gamesmanship and jurisdictional competition, confuse public accountability, and interfere with interstate commerce.

Size of operation

Should the number of animals (animal units) be the basis of regulation under the CWA? Oral tradition has it that 1,000 animal units was picked as the cut-off for the point source designation because in 1976, when the regulations were being written, only a few operations exceeded this size, and consequently the cost of the regulation was minimized. As of 1992 however, 6,600 animal feeding operations (about 15 percent of all AFOs) exceeded 1,000 animal units (GAO), and this number is increasing rapidly. Is it the number of animals in an operation or the number of animals in a watershed that matters environmentally? It would seem that size, in terms of animal units, is being used as a proxy for the ability to pay for waste management, or for the amount of environmental damage being generated. If that is so, a more refined approach might be desirable.

Economies of scale may affect the profitability of waste management. If this is the case, eliminating size cut-off levels will likely put smaller farms at a competitive disadvantage and consequently accelerate concentration in livestock production. However, size cut-offs do encourage producers to organize their operations so that the livestock numbers in a facility fall just below the regulatory cut-off level. Concern over affordability and economies of scale should not necessarily result in no controls for smaller operations. That being the case, regulations must find some sort of compromise to protect both the industry's viability and the environment.

Who pays?

New regulations are sure to impose a cost on producers. Who should bear these costs? Many growers now operate under contract (Welsh). Under most contract production arrangements, the integrator makes all of the production decisions, specifies the technologies to be employed, provides almost all variable inputs and needed technical advice, and retains title to the animals. In such cases, should the grower be responsible for environmental liabilities, or should they be shared by the grower and integrator? What enforcement problems does such a policy pose for the regulatory agency?

Farmers incur costs to build waste management

facilities. Other costs include those for better management plans and soil/manure testing. Should the government subsidize these activities? Should the generating farm or the receiving location bear manure transport costs? Should government funds be provided to encourage composting?

Things to think about

Revising the current NPDES regulations for confined animal feeding operations rapidly becomes a complicated problem. Many issues must be addressed and many trade-offs must be consciously made. How should land application of livestock wastes be treated? How do you encourage the movement of livestock out of overburdened watersheds without creating an administrative nightmare? How do we protect groundwater supplies when the CWA gives EPA no clear jurisdiction over groundwater? Problems with odors, methane emissions, and air deposition of nitrogen are other important issues outside the scope of the CWA. How should these be addressed? Perhaps the most important questions ultimately revolve around the siting of animal agricultural facilities. Generally, siting issues fall outside the domain of federal authority. What effects will regulations have on these siting decisions, if any?

What is the appropriate trade-off between addressing geographic heterogeneity in soils, climate, and animal production on the one hand, and accountability and administrative feasibility on the other? How do we make sure that the people who make the production decisions and have access to capital bear the cost of managing the waste that results from their location and production decisions? What effect will environmental regulations have on the structure of American agriculture? Will the preservation of the small family farm be in jeopardy? Can we minimize the regulatory burden on small producers without relieving them entirely of their responsibility for keeping the waters of the United States clean? ◘

■ For More Information

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