

IV. Why is EPA Changing the Effluent Guidelines for Feedlots and the NPDES CAFO Regulations?

A. Main Reasons For Revising the Existing Regulations

Despite more than twenty years of regulation, there are persistent reports of discharge and runoff of manure and manure nutrients from livestock and poultry operations. While this is partly due to inadequate compliance with existing regulations, EPA believes that the regulations themselves also need revision. Today's proposed revisions to the existing effluent guidelines and NPDES regulations for CAFOs are expected to mitigate future water quality impairment and the associated human health and ecological risks by reducing pollutant discharges from the animal production industry.

EPA's proposed revisions also address the changes that have occurred in the animal production industries in the United States since the development of the existing regulations. The continued trend toward fewer but larger operations, coupled with greater emphasis on more intensive production methods and specialization, is concentrating more manure nutrients and other animal waste constituents within some geographic areas. This trend has coincided with increased reports of large-scale discharges from these facilities, and continued runoff that is contributing to the significant increase in nutrients and resulting impairment of many U.S. waterways.

EPA's proposed revisions of the existing regulations will make the regulations more effective for the purpose of protecting or restoring water quality. The revisions will also make the regulations easier to understand and better clarify the conditions under which an AFO is a CAFO and, therefore, subject to the regulatory requirements of today's proposed regulations.

B. Water Quality Impairment Associated with Manure Discharge and Runoff

EPA has made significant progress in implementing CWA programs and in reducing water pollution. Despite such progress, however, serious water quality problems persist throughout the country. Agricultural operations, including CAFOs, are considered a significant source of water pollution in the United States. The recently released *National Water Quality Inventory: 1998 Report to Congress* was prepared under Section 305(b) of the Clean Water Act. Under this section of the Act, States report their impaired water bodies to EPA, including the suspected sources of those impairments. The most recent report indicates that the agricultural sector (including crop production, pasture and range grazing, concentrated and confined animal feeding operations, and aquaculture) is the leading contributor to identified water quality impairments in the nation's rivers and streams, and also the leading contributor in the nation's lakes, ponds, and reservoirs. Agriculture is also identified as the fifth leading contributor to identified water quality impairments in the nation's estuaries. 1998 *National Water Quality Inventory* results are illustrated in table 4-1 below.

Table 4-1. Five Leading Sources of Water Quality Impairment in the United States

Rank	Rivers	Lakes	Estuaries
1	Agriculture (59%)	Agriculture (31%)	Municipal Point Sources (28%)
2	Hydro modification (20%)	Hydro modification (15%)	Urban Runoff / Storm Sewers (28%)
3	Urban Runoff / Storm Sewers (11%)	Urban Runoff/Storm Sewers (12%)	Atmospheric Deposition (23%)
4	Municipal Point Sources (10%)	Municipal Point Sources (11%)	Industrial Discharges (15%)
5	Resource Extraction (9%)	Atmospheric Deposition (8%)	Agriculture (15%)

Source: National Water Quality Inventory: 1998 Report to Congress, USEPA, 2000.

Percentage of impairment attributed to each source is shown in parentheses. For example, agriculture is listed as a source of impairment in 59 percent of impaired river miles. The portion of “agricultural” impairment attributable to animal waste (as compared to crop production, pasture grazing, range grazing, and aquaculture) is not specified in this value. Figure totals exceed 100 percent because water bodies may be impaired by more than one source.

Table 4-2 presents additional summary statistics of the 1998 *National Water Quality Inventory*. These figures indicate that the agricultural sector contributes to the impairment of at least 170,000 river miles, 2.4 million lake acres, and almost 2,000 estuarine square miles. Twenty-eight states and tribes identified specific agricultural sector activities contributing to water quality impacts on rivers and streams, and 16 states and tribes identified specific agricultural sector activities contributing to water quality impacts on lakes, ponds, and reservoirs. CAFOs are a subset of the agriculture category. For rivers and streams, estimates from these states indicate that 16 percent of the total reported agricultural sector impairment is from the animal feeding operation industry (including feedlots, animal holding areas, and other animal operations), and 17 percent of the agricultural sector impairment is from both range and pasture grazing. For lakes, ponds, and reservoirs, estimates from these states indicate that 4 percent of the total reported agricultural sector impairment is from the animal feeding operation industry, and 39 percent of the agricultural sector impairment is from both range and pasture grazing. Impairment due specifically to land application of manure was not reported.

Table 4-2. Summary of U.S. Water Quality Impairment Survey

Total Quantity in U.S.	Waters Assessed	Quantity Impaired by All Sources	Quantity Impaired by Agriculture ^a
Rivers 3,662,255 miles	23% of total 840,402 miles	35% of assessed 291,263 miles	59% of impaired 170,750 miles
Lakes, Ponds, and Reservoirs 41.6 million acres	42% of total 17.4 million acres	45% of assessed 7.9 million acres	31% of impaired 2,417,801 acres
Estuaries 90,465 square miles	32% of total 28,687 square miles	44% of assessed 12,482 square miles	15% of impaired 1,827 square miles

Source: National Water Quality Inventory: 1998 Report to Congress, USEPA, 2000.

^a CAFOs are a subset of the agriculture category.

Table 4-3 below lists the leading pollutants impairing surface water quality in the United States as identified in the 1998 *National Water Quality Inventory*. The animal production industry is a potential source of all of these, but is most commonly associated with nutrients, pathogens, oxygen-depleting substances, and solids (siltation). Animal production facilities are also a potential source of the other leading causes of water quality impairment, such as metals and pesticides, and can contribute to the growth of noxious aquatic plants due to the discharge of excess nutrients. Animal production facilities may also contribute loadings of priority toxic organic chemicals and oil and grease, but to a lesser extent than other pollutants.

Table 4-3. Five Leading Causes of Water Quality Impairment in the United States

Rank	Rivers	Lakes	Estuaries
1	Siltation (38%)	Nutrients (44%)	Pathogens (47%)
2	Pathogens (36%)	Metals (27%)	Oxygen-Depleting Substances (42%)
3	Nutrients (29%)	Siltation (15%)	Metals (27%)
4	Oxygen-Depleting Substances (23%)	Oxygen-Depleting Substances (14%)	Nutrients (23%)
5	Metals (21%)	Suspended Solids (10%)	Thermal Modifications (18%)

Source: National Water Quality Inventory: 1998 Report to Congress, USEPA, 2000.

Percent impairment attributed to each pollutant is shown in parentheses. For example, siltation is listed as a cause of impairment in 51 percent of impaired river miles. All of these pollutants except thermal modifications are commonly associated with animal feeding operations to varying degrees, though they are also attributable to other sources. Figure totals exceed 100 percent because water bodies may be impaired by more than one source.

Pollutants associated with animal production can also originate from a variety of other sources, such as cropland, municipal and industrial wastewater discharges, urban runoff, and septic systems. The national analyses described in Section V of this preamble are useful in assessing the significance of animal waste as a potential or actual contributor to water quality degradation across the United States. Section V also discusses the environmental impacts and human health effects associated with the pollutants found in animal manure.

C. Recent Changes in the Livestock and Poultry Industry

EPA's proposed revisions of the existing effluent guidelines and NPDES regulations take into account the major structural changes that have occurred in the livestock and poultry industries since the 1970s when the regulatory controls for CAFOs were first instituted. These changes include:

- C Increased number of animals produced annually;
- C Fewer animal feeding operations and an increase in the share of larger operations that concentrate more animals, manure and wastewater in a single location;
- C Geographical shifts in where animals are produced; and
- C Increased coordination between animal feeding operations and processing firms.

1. Increased Livestock and Poultry Production

Since the 1970s, total consumer demand for meat, eggs, milk and dairy products has continued to increase. To meet this demand, U.S. livestock and poultry production have risen sharply, resulting in an increase in the number of animals produced and the amount of manure and wastewater generated annually.

Increased sales from U.S. farms is particularly dramatic in the poultry sectors, as reported in the Census of Agriculture (various years). In 1997, turkey sales totaled 299 million birds. In comparison, 141 million turkeys were sold for slaughter in 1978. Broiler sales totaled 6.4 billion chickens in 1997, up from 2.5 billion chickens sold in 1974. The existing CAFO regulations effectively do not cover broiler operations because they exclude operations that use dry manure management systems. Red meat production also rose during the 1974-1997 period. The number of hogs and pigs sold increased from 79.9 million hogs in 1974 to 142.6 million hogs in 1997. Sales data for fed cattle (i.e., USDA's data category on "cattle fattened on grain and concentrates") for 1975 show that 20.5 million head were marketed. By 1997, fed cattle marketings totaled 22.8 million head. The total number of egg laying hens rose from 0.3 million birds in 1974 to 0.4 million birds in 1997. The number

of dairy cows on U.S. farms, however, dropped from more than 10.7 million cows to 9.1 million cows over the same period.

Not only are more animals produced and sold each year, but the animals are also larger in size. Efficiency gains have raised animal yields in terms of higher average slaughter weight. Likewise, production efficiency gains at egg laying and dairy operations have resulted in higher per-animal yields of eggs and milk. USDA reports that the average number of eggs produced per egg laying hen was 218 eggs per bird in 1970 compared to 255 eggs per bird in 1997. The National Milk Producers Federation reports that average annual milk production rose from under 10,000 pounds per cow in 1970 to more than 16,000 pounds per cow in 1997. In the case of milk production, these efficiency gains have allowed farmers to maintain or increase production levels with fewer animals. Although animal inventories at dairy farms may be lower, however, this may not necessarily translate to reduced manure volumes generated because higher yields are largely attributable to improved and often more intensive feeding strategies that may exceed the animal's ability for uptake. This excess is not always incorporated by the animal and may be excreted.

2. Increasing Share of Larger, More Industrialized Operations

The number of U.S. livestock and poultry operations is declining due to ongoing consolidation in the animal production industry. Increasingly, larger, more industrialized, highly specialized operations account for a greater share of all animal production. This has the effect of concentrating more animals, and thus more manure and wastewater, in a single location, and raising the potential for significant environmental damages unless manure is properly stored and handled.

USDA reports that there were 1.1 million livestock and poultry farms in the United States in 1997, about 40 percent fewer than the 1.7 million farms reported in 1974. Farms are closing, especially smaller operations that cannot compete with large-scale, highly specialized, often lower cost, producers. Consequently, the livestock and poultry industries are increasingly dominated by larger operations. At the same time, cost and efficiency considerations are pushing farms to become more specialized and intensive. Steep gains in production efficiency have allowed farmers to produce more with fewer animals because of higher per-animal yields and quicker turnover of animals between farm production and consumer market. As a result, annual production and sales have increased, even though the number of animals on farms at any one time has declined (i.e., an increase in the number of marketing cycles over the course of the year allows operators to maintain production levels with fewer animals at any given time, although the total number of animals produced by the facility over the year may be greater).

The increase in animal densities at operations is evident by comparing the average number of animals per operation between 1974 and 1997, as derived from Census of Agriculture data. In the poultry sectors, the average number of birds across all operations is four to five times greater in 1997 than in 1974. In 1997, the number of broilers per operation averaged 281,700 birds, up from 73,300

birds in 1974. Over the same period, the average number of egg laying hens per operation rose from 1,100 layers to 5,100 layers per farm, and the average number of turkeys per operation rose from 2,100 turkeys to 8,600 turkeys. The average number of hogs raised per operation rose from under 100 hogs to more than 500 hogs between 1974 and 1997. The average number of fed cattle and dairy cows per operation more than doubled during the period, rising to nearly 250 fed cattle and 80 milking cows by 1997.

This trend toward fewer, larger, and more industrialized operations has contributed to large amounts of manure being produced at a single geographic location. The greatest potential risk is from the largest operations with the most animals given the sheer volume of manure generated at these facilities. Larger, specialized facilities often do not have an adequate land base for manure disposal through land application. A USDA analysis of 1997 Census data shows that animal operations with more than 1,000 AU account for more than 42 percent of all confined animals but only 3 percent of cropland held by livestock and poultry operations. As a result, large facilities need to store significant volumes of manure and wastewater which have the potential, if not properly handled, to cause significant water quality impacts. By comparison, smaller operations manage fewer animals and tend to concentrate less manure at a single farming location. Smaller operations also tend to be more diversified, engaging in both animal and crop production. These operations often have sufficient cropland and fertilizer needs to land apply manure generated by the farm's livestock or poultry business, without exceeding that land's nutrient requirements.

Another recent analysis from USDA confirms that as animal production operations have become larger and more specialized operations, the opportunity to jointly manage animal waste and crop nutrients has decreased. Larger operations typically have inadequate land available for utilizing manure nutrients. USDA estimates that the amount of nitrogen from manure produced by confinement operations increased about 20 percent between 1982 and 1997, while average acreage on livestock and poultry farms declined. Overall, USDA estimates that cropland controlled by operations with confined animals has the assimilative capacity to absorb about 40 percent of the calculated manure nitrogen generated by these operations. EPA expects this excess will need to be transported offsite.

3. Geographic Shifts in Where Animal are Raised

During the 1970s, the majority of farming operations were concentrated in rural, agricultural areas and manure nutrients generated by animal feeding operations were readily incorporated as a fertilizer for crop production. In an effort to reduce transportation costs and streamline distribution between the animal production and food processing sectors, livestock and poultry operations have tended to cluster near slaughtering and manufacturing plants as well as near end-consumer markets. Ongoing structural and technological change in these industries also influences where facilities operate and contributes to locational shifts from the more traditional farm production regions to the more emergent regions.

Operations in more traditional producing states tend to grow both livestock and crops and tend to have adequate cropland for land application of manure. Operations in these regions also tend to be smaller in size. In contrast, confinement operations in more emergent areas, such as hog operations in North Carolina or dairy operations in the Southwest, tend to be larger in size and more intensive types of operations. These operations tend to be more specialized and often do not have adequate land for application of manure nutrients. Production is growing rapidly in these regions due to competitive pressures from more specialized producers who face lower per-unit costs of production. This may be shifting the flow of manure nutrients away from more traditional agricultural areas, often to areas where these nutrients cannot be easily absorbed.

As reported by Census data, shifts in where animals are grown is especially pronounced in the pork sector. Traditionally, Iowa has been the top ranked pork producing state. Between 1982 and 1997, however, the number of hogs raised in that state remained relatively constant with a year-end inventory average of about 14.2 million pigs. In comparison, year-end hog inventories in North Carolina increased from 2.0 million pigs in 1982 to 9.6 million pigs in 1997. This locational shift has coincided with reported nutrient enrichment of the waters of the Pamlico Sound in North Carolina. Growth in hog production also occurred in other emergent areas, including South Dakota, Oklahoma, Wyoming, Colorado, Arizona, and Utah. Meanwhile, production dropped in Illinois, Indiana, Wisconsin, and Ohio.

The dairy industry has seen similar shifts in where milk is produced, moving from the more traditional Midwest and Northeast states to the Pacific and Southwestern states. Between 1982 and 1997, the number of milk cows in Wisconsin dropped from 1.9 million to 1.3 million. Milk cow inventories have also declined in other traditional states, including Illinois, Indiana, Iowa, Minnesota, Missouri, New York, Pennsylvania, Ohio, Connecticut, Maryland, and Vermont. During the same period, milk cow inventories in California rose from 0.9 million in 1982 to 1.4 million in 1997. In 1994, California replaced Wisconsin as the top milk producing state. Milk cow inventories have also increased in Texas, Idaho, Washington, Oregon, Colorado, Arizona, Nevada, and Utah. These locational shifts have coincided with reported nutrient enrichment of waters, including the Puget Sound and Tillamook Bay in the northwest, the Everglades in Florida, and Erath County in Texas, and also elevated salinity levels due to excess manure near milk production areas in southern California's Chino Basin.

4. Increased Linkages between Animal Production Facility and Food Processors

Over the past few decades, closer ties have been forged between growers and various industry middlemen, including packers, processors, and cooperatives. Increased integration and coordination is being driven by the competitive nature of agricultural production and the dynamics of the food marketing system, in general, as well as seasonal fluctuations of production, perishability of farm products, and the inability to store and handle raw farm output. Closer ties between the animal

production facility and processing firms—either through contractual agreement or through corporate ownership of CAFOs—raises questions of who is responsible for ensuring proper manure disposal and management at the animal feeding site. This is especially true given the current trend toward larger animal confinement operations and the resultant need for increased animal waste management. As operations become larger and more specialized, they may contract out some phases of the production process.

Farmers and ranchers have long used contracts to market agricultural commodities. However, increased use of production contracts is changing the organizational structure of the individual industries. Under a production contract, a business other than the feedlot where the animals are raised and housed, such as a processing firm, feed mill, or animal feeding operation, may own the animals and may exercise further substantial operational control over the operations of the feedlot. In some cases, the processor may specify in detail the production inputs used, including the genetic material of the animals, the types of feed used, and the production facilities where the animals are raised. The processor may also influence the number of animals produced at a site. In general, these contracts do not deal with management of manure and waste disposal. Recently, however, some processors have become increasingly involved in how manure and waste is managed at the animal production site.

The use of production contracts in the livestock and poultry industries varies by commodity group. Information from USDA indicates that production contracts are widely used in the poultry industry and dominate broiler production. Production contracting is becoming increasingly common in the hog sector, particularly for the finishing stage of production in regions outside the Corn Belt.

Production contracting has played a critical role in the growth of integrators in the poultry sectors. Vertical integration has progressed to the point where large, multifunction producer-packer-processor-distributor firms are the dominant force in poultry and egg production and marketing. Data from USDA on animal ownership at U.S. farms illustrates the use of production contracts in these sectors. In 1997, USDA reported that 97 percent of all broilers raised on U.S. farms were not owned by the farmer. In the turkey and egg laying sectors, use of production contracts is less extensive since 70 percent and 43 percent of all birds in these sectors, respectively, were not owned by the farmer. In the hog sector, data from USDA indicate that production contracting may account for 66 percent of hog production among larger producers in the Southern and Mid-Atlantic states. This differs from the Midwest, where production contracting accounted for 18 percent of hog production in 1997.

By comparison, production contracts are not widely used in the beef and dairy sectors. Data from USDA indicate that less than 4 percent of all beef cattle and 1 percent of all milking cows were not owned by the farmer in 1997. However, production contracts are used in these industries that specialize in a single stage of livestock production, such as to “finish” cattle prior to slaughter or to produce replacement breeding stock. However, this use constitutes a small share of overall production across all producers.

To further examine the linkages between the animal production facility and the food processing firms, and to evaluate the geographical implications of this affiliation, EPA conducted an analysis that shows a relationship between areas of the country with an excess of manure nutrients from animal production operations and areas with a large number of meat packing and poultry slaughtering facilities. This manure—if land applied—would be in excess of crop uptake needs and result in over application and enrichment of nutrients. Across the pork and poultry sectors, this relationship is strongest in northwest Arkansas, where EPA estimates a high concentration of excess manure nutrients and a large number of poultry and hog processing facilities. By sector, EPA’s analysis shows that there is excess poultry manure nutrients and a large number of poultry processing plants in the Delmarva Peninsula in the mid-Atlantic, North Carolina, northern Alabama, and also northern Georgia. In the hog sector, the analysis shows excess manure nutrients and a large number of meat packing plants in Iowa, Nebraska and Alabama. The analysis also shows excess manure nutrients from hogs in North Carolina, but relatively fewer meat packing facilities, which is likely explained by continuing processing plant closure and consolidation in that state. More information on this analysis is provided in the rulemaking record.

D. Improve Effectiveness of Regulations

As noted in Section IV.B, reports of continued discharges and runoff from animal production facilities have persisted in spite of regulatory controls that were first instituted in the 1970s. EPA is proposing to revise the effluent guidelines and NPDES regulations to improve their effectiveness by making the regulations simpler and easier to understand and implement. Another change intended to improve the effectiveness of the regulations is clarification of the conditions under which an AFO is a CAFO and is, therefore, subject to the NPDES regulatory requirements. In addition, EPA is revising the existing regulation to remove certain provisions that are no longer appropriate.

The existing regulations were designed to prohibit the release of wastewater from the feedlot site, but did not specifically address discharges that may occur when wastewater or solid manure mixtures are applied to crop, pasture, or hayland. The proposed regulations address the environmental risks associated with manure management. The proposed revisions also are more reflective of current farm production practices and waste management controls.

Today’s proposed revised regulations also seek to improve the effectiveness of the existing regulations by focusing on those operations that produce the majority of the animal manure and wastewater generated annually. EPA estimates that the proposed regulations will regulate, as CAFOs, about 7 to 10 percent of all animal confinement operations nationwide, and will capture between 64 percent and 70 percent of the total amount of manure generated at CAFOs annually, depending on the proposed regulatory alternative (discussed in more detail in Section VI.A). Under the existing regulations, few operations have obtained NPDES permits. Presently, EPA and authorized States have issued approximately 2,500 NPDES permits. This is less than 1 percent of the estimated 376,000 animal confinement operations in the United States. EPA’s proposed revisions are intended to ensure that all CAFOs, as defined under the proposed regulations, will apply for and obtain a permit.