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An Agricultural Law Research Article

Governmental Oversight of Animal Feeding Operations

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Table of Contents

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A. Introduction

Changes in animal production in the United States at animal feeding operations (AFOs) have been accompanied by concerns about those operations' waste byproducts and production practices.[1] With the marked expansion of concentrated animal feeding operations (CAFOs) and the problems associated with large numbers of animals in confined areas, a number of issues have attracted the attention of the public.[2] One of these issues has been water contamination. The Environmental Protection Agency responded to the issue of water contamination caused by animal production by issuing new final regulations for CAFOs effective on April 14, 2003.[3] Other animal production issues remain unresolved and some members of the public seek further governmental oversight of practices employed in the commercial production of animal products.[4]

This article provides an overview of several production and environmental issues associated with concentrated animal production. The first section provides information on conditions that have created public dissatisfaction with existing regulatory efforts. The remaining sections address the issue of water contamination, commencing with an analysis of the evidence cited in justification of the new federal water quality regulations. Although animal production is causing problems, governmental data showing water impairment is fragmentary. With this background, the third section looks at the voluntary efforts employed by producers to control environmental problems, followed by section four on new federal regulations involving mandatory controls for some producers. Section five considers the administration and enforcement of CAFO regulations, noting that the enforcement of existing regulations might obviate the

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1. *See* Charles W. Abdalla, *The Industrialization of Agriculture: Implications for Public Concern and Environmental Consequences of Intensive Livestock Operations*, 10 PENN ST. ENVTL. L. REV. 175 (2002); Terence J. Centner, *Legal Structures Governing Animal Waste Management*, Chapter 15, in NATIONAL CENTER FOR MANURE AND ANIMAL WASTE MANAGEMENT WHITE PAPERS (Raleigh, NC: North Carolina State University, 2002); Michael Steeves, *The EPA's Proposed CAFO Regulations Fall Short of Ensuring the Integrity of Our Nation's Waters*, 22 J. LAND RESOURCES & ENVTL. L. 367 (2002).

2. Environmental Protection Agency, *National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations;* 66 Fed. Reg. 2960-3145 (proposed Jan. 12, 2001) [EPA Proposed Rule].

3. Environmental Protection Agency, *National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations*, 68 Fed. Reg. 7176-7274 (Feb. 12, 2003) (to be codified at 40 C.F.R., pts. 122 & 412) [EPA CAFO Regulations].

4. *See* Stephen Smith, *U.S. Farms Called Vulnerable to Terrorism*, BOSTON GLOBE, Nov. 22, 2002, at A2; *The Curse of Factory Farms*, N.Y. TIMES, Aug. 30, 2002, at A18.

need for additional controls. The materials in these sections show multiple opportunities for addressing the production and environmental issues related to the production of animals.

B. Production and Environmental Issues

As a society is able to provide more amenities to its people, it often has a greater interest in protecting resources and reducing carcinogens that may adversely affect humans and other species. Significant concerns about the negative effects associated with the large-scale production of animals are associated with increased governmental oversight.[5] Growing public opposition to large-scale animal operations and lax regulatory practices that allow animal wastes to enter waterbodies have resulted in new directives by federal, state, and local governments.[6]

Although animal production generates unpleasant situations, most producers have adopted management practices to help reduce the negative byproducts from their husbandry activities. Typically, producers have spent considerable funds for equipment, structures, and practices to reduce the adverse effects of their operations. Nonetheless, governmental data shows impaired waters and disagreeable activities.[7] Public interest groups continue to petition for governmental involvement as a way to alter conditions and practices they find offensive.[8]

Despite the adoption of voluntary controls, unacceptable water quality conditions have led governments to pursue a second strategy involving mandatory controls. State legislatures have adopted numerous regulations addressing problems that accompany the production of animals. However, some members of the public believe there are other concerns that need to be addressed. A further awareness of these issues may assist producers and agricultural interest groups in devising practices and strategies to abate concerns. Through preventive measures the industry may reduce the likelihood of more drastic regulatory mandates. For AFOs, six contemporary issues might be addressed through further voluntary production and management practices: (1) excess nitrogen and phosphorus, (2) health effects, (3) objectionable odors, (4) concern about antibiotics, (5) animal welfare, and (6) loss of resources.

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5. *See* Erika N. Hartliep, Comment, *Federal and Pacific Northwest State Water Laws Pertaining to Dairies*, 37 IDAHO L. REV. 681 (2001); Mark Metcalfe, *State Legislation Regulating Animal Manure Management*, 22 REV. AGRIC. ECON. 519 (2002).

6. *See* Theodore A. Feitshans & Kelly Zering, *Federal Regulation of Animal and Poultry Production Under the Clean Water Act: Opportunities for Employing Economic Analysis to Improve Societal Results*, 10 PENN ST. ENVTL. L. REV. 193 (2002); David R. Gillay, *Oklahoma's Concentrated Animal Feeding Operations Act: Balancing the Interests of Landowners with the Exponential Growth of the Hog Industry*, 35 TULSA L.J. 627 (2000).

7. Office of Water, Environmental Protection Agency, *National Water Quality Inventory: 1998 Report to Congress* (2000) [*National Inventory*].

8. *See* Tom Abate, *S.F. Businessman Evolves from Clothier to Eco-Philanthropist*, THE S.F. CHRONICLE, July 15, 2002, at E1 (noting financial support for activism); Greg Pierce, *Inside Politics*, WASH. TIMES, Apr. 18, 2002, at A07 (opposing large hog operations); Kenneth R. Weiss, *Fish Farms Become Feedlots of the Sea; Like Cattle Pens, the Salmon Operations Bring Product to Market Cheaply. But Harm to Ocean Life and Possibly Human Health Has Experts Worried*, L. A. TIMES, Dec. 9, 2002, at pt. 1, p. 1.

1. Excess Nitrogen and Phosphorus

The production of animals at AFOs involves importing feed products that contain nutrients to maximize animal growth.[9] After ingesting the food, animals produce large quantities of waste. All confined livestock and poultry operations generate three times as much raw waste as is generated by humans in the United States.[10] With large numbers of animals at individual production facilities, producers are often challenged to dispose of their waste without denigrating the environment.[11]

Each year AFOs produce an estimated 1.23 and 1.32 million tons of economically recoverable units of nitrogen and phosphorus, respectively.[12] Nitrates from animal manure are water soluble and can therefore leach into groundwater or run off into surface water.[13] Phosphorus is less mobile in the soil than nitrogen, but eroding soils carry phosphates into waterbodies.

Excessive quantities of nitrates and phosphates in waterbodies lead to nutrient enrichment causing increased algae growth that takes up dissolved oxygen from the water. Cyanobacterial blooms and subsequent vegetative death decrease the oxygen in water and may cause both vegetation and fish to die off.[14] Phosphates often contribute to the eutrophication of freshwater while nitrates are more commonly associated with coastal water eutrophication.[15] Nutrients and particles from this waste are thought to account for nine percent of our country's impaired river and stream miles.[16] The new federal CAFO regulations address this issue for CAFOs, but some believe further efforts are needed to address other sources of these nutrients, especially AFOs and fertilizer inputs.

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9. Neil C. Hansen et al., *The Fate and Transport of Phosphorus in Agricultural Systems*, 57 J. SOIL & WATER CONSERVATION 408, 414 (2002).

10. Office of Wastewater Management, Environmental Protection Agency, *State Compendium: Programs and Regulatory Activities Related to Animal Feeding Operations* (2001).

11. Noel Gollehon et al., *Confined Animal Production and Manure Nutrients*, U.S. Department of Agriculture, Economic Research Service Agriculture Information Bulletin No. 771 (2001); Josh Marks, Note & Comment, *Regulating Agricultural Pollution in Georgia: Recent Trends and the Debate over Integrator Liability*, 18 GA. ST. U.L. REV. 1031 (2002); Michael M. Meloy, *An Overview of Nutrient Management Requirements in Pennsylvania*, 10 PENN ST. ENVTL. L. REV. 249 (2002).

12. Harold Taylor, *Nutrients*, in AGRICULTURAL RESOURCES AND ENVIRONMENTAL INDICATORS, 1996-97, Washington, DC: U.S. Department of Agriculture, Economic Research Service Agricultural Handbook No. 712 (1997), at 97-114.

13. David G. Abler & James S. Shortle, *The Economic Performance of Alternative Agricultural Nonpoint Pollution Controls*, 48 OKLA. L. REV. 427, 429 (1995).

14. Andrew Sharpley, B. Foy, & P. Withers, *Practical and Innovative Measures for the Control of Agricultural Phosphorus Losses to Water: An Overview*, 29 J. ENVTL. QUALITY 1 (2000).

15. Abler and Shortle, *supra* note 13.

16. U.S. General Accounting Office, *Animal Agriculture: Information on Waste Management and Water Quality Issues*, GAO/RCED-95-200BR (June 1995), at 11.

2. Health Effects

Losses from bovine spongiform encephalopathy (mad cow disease) demonstrate how new pathogens can severely impact our lives.[17] Health-related problems that accompany the production of animals at AFOs may embody situations that warrant further mandatory governmental controls.[18] Anxieties about possible fecal contamination from AFOs and the potential for animal wastes to cause illness are especially noteworthy.[19] The potential human health effect from excess nitrate in drinking water is a concern.[20] Given the nutrients and pathogens in animal manure, animal production practices are associated with health problems.[21]

Animal waste may contain hepatitis E viruses, reoviruses, rotaviruses, adenoviruses, caliciviruses, and influenza viruses.[22] Parasites, including *Cryptosporidium parvum, Giardia lamblia*, and *Balantidium coli* are present in animal manure. Bacteria such as *Salmonella ssp., Campylobacter spp., Escherichia coli, Aeromonas hydrophila, Yersinia enterocolitica, Vibrio spp., Leptospira spp.*, and *Listeria spp.*, can also appear in animal manure. Researchers have found that *Giardia* cysts can survive up to thirty-three days in animal waste.[23] *Salmonella* contained in animal waste can survive up to three weeks on vegetation, thirty-six months in feces, and over two years in soil.[24] Researchers are still looking at the evidence to determine whether these pathogens are more pronounced in wastes from CAFOs than from AFOs.

An additional health concern involves the increased risk of chronic respiratory diseases associated with swine confinement operations.[25] Several studies have shown that swine confinement workers have

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17. Robert V. Tauxe, *Emerging Foodborne Pathogens*, 78 INT'L J. FOOD MICROBIOLOGY 31, 34 (2002).

18. *See* Dana Cole, Lori Todd, & Steve Wing, *Concentrated Swine Feeding Operations and Public Health: A Review of Occupational and Community Health Effects*, 108 ENVTL. HEALTH PERSPECTIVES 685 (2000); K.M. Thu, *Public Health Concerns for Neighbors of Large-Scale Swine Production Operations*, 8 J. AGRIC. SAFETY & HEALTH 175 (2002).

19. *National Inventory*, *supra* note 7, at Executive Summary 2.

20. Keynen J. Wall, *Knowing When To Say When To Hog Waste: Do State Lagoon Regulations Adequately Protect Ground Water in Kansas?*, 11 KAN. J.L. & PUB. POL'Y 113, 119 (2001).

21. B. Delworth Gardner, PLOWING GROUND IN WASHINGTON: THE POLITICAL ECONOMY IN U.S. AGRICULTURE (San Francisco: Pacific Research Institute for Public Policy, 1995), at 273.

22. Mark D. Sobsey et al., *Pathogens in Animal Wastes and the Impacts of Waste Management Practices on Their Survival, Transport and Fate*, Chapter 17, in NATIONAL CENTER FOR MANURE AND ANIMAL WASTE MANAGEMENT WHITE PAPERS (Raleigh, NC: North Carolina State University, 2002).

23. P.S. Hooda et al., *A Review of Water Quality Concerns in Livestock Farming Areas*, 250 SCI. OF THE TOTAL ENVT. 159 (2000).

24. *Id.*

25. Thu, *supra* note 18, at 177.

health problems associated with their environment.[26] Persons living next to AFOs, as well as those working in buildings with animal manure, have reported health maladies including respiratory irritation, headaches, diarrhea, and sore throats.[27]

Other notable public health incidents have been blamed on animal waste. Fish kills in North Carolina,[28] a cryptosporidiosis epidemic in Milwaukee's water supply,[29] and deaths from *E. coli* in a Canadian public water supply[30] were allegedly caused by animal manure. Early conjectures about severe acute respiratory syndrome (SARS) associate the disease with animals.[31]

3. Objectionable Odors

Objectionable odors from AFOs are a major issue that has been addressed by some state governments.[32] While swine operations garner the most unfavorable publicity, poultry operations, dairy farms, and stockyards also pose problems due to ammonia fumes. Options for reducing or eliminating odors have been a prominent feature of best management practices. Some of the available strategies draw on practices and technologies that are relatively common and inexpensive; other practices are costly.

Odors vary with location, production practices, season, temperature, humidity, time of day, and wind conditions. For some odors, people can detect low concentrations, such as hydrogen sulfide, which produces a rotten egg smell. For other gases, higher concentrations are necessary before they become a problem. The main compounds that humans detect at these higher levels are ammonia and sulfur compounds generated by microbial decomposition.

Strategies exist for moderating the intensity of odors. For buildings and holding facilities, ventilation and proper cleaning can reduce odors. A covering of water over manure in pits can reduce emissions of ammonia and hydrogen sulfide gas. For lagoons, the correct correlation of size with the number of animals can reduce odors. Liquid waste may be injected into the ground to eliminate most of the odor.

For manure application, best management practices can be effective in reducing odors. Farmers can control the timing, location, and type of application. Manure should not be applied on calm, humid

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26. *Id.*

27. *Animal Factories: Pollution and Health Threats to Rural Texas*, CONSUMERS UNION SWRO, May 2000.

28. Ronald Smothers, *Spill Puts a Spotlight On a Powerful Industry*, N.Y. TIMES, June 30, 1995, at A10.

29. Marilynn Marchione, *Judge Reduces Cryto Claims Against City*, MILWAUKEE J. SENTINEL, Mar. 14, 1998, at 1.

30. M.A.J. McKenna, E. Coli *Danger High for Months? Ontario Town Battling Bacteria, Fear*, ATLANTA CONST., May 30, 2000, at A1.

31. Marsha Austin, *CDC testing suspected SARS samples Scientists probe coronavirus link*, THE DENVER POST, April 4, 2003, at A-05

32. *See* Gary Troxell, *State Has Power to Regulate Factory Farm Odor*, 9 MO. ENVTL. L. & POL'Y REV. 41 (2001).

days since the odors will not dissipate. When known windy conditions are likely to carry odors to neighbors, farmers can refrain from applying manure. Many farmers attempt to apply manure immediately before plowing or cultivation so that the odors are quickly reduced when the manure is inverted under a layer of soil.

Legislators and regulators have incorporated practices into mandatory laws and regulations in an attempt to reduce odors. The most important are setback rules for AFOs. Regulators determine setback distances that new AFO facilities need to maintain between their operations and various land uses. In a few cases, regulators use parametric formulas or dispersion models based on animal units, housing systems, and physical size of the operation to calculate restrictions on expected odors.[33] Dispersion models can draw upon data concerning airborne emissions, weather conditions, and topography to establish setback distances. These models may achieve odor control objectives without mandating analogous far-reaching setbacks for all operators.

4. Concerns About Antibiotics

Commercial confined livestock production in the United States is dependent on antimicrobial drugs.[34] More than eight times as many antibiotics are administered to domestic livestock as humans.[35] While most people affirm the need to use antibiotics to treat active infections in animals, less than eight percent of the antibiotics administered to animals are for this purpose.[36]

Producers of animals are using antibiotics at low levels for therapeutic disease treatments, to improve feed efficiency, and to increase daily rates of weight gain.[37] Antibiotics may also enhance carcass quality in cattle.[38] Researchers have estimated that hog producers earn a net return of $1.26 to $2.76 per pig by using subtherapeutic antibiotics.[39] Governmental data suggest that about fifty-seven

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33. Larry D. Jacobson et al., *Site Selection of Animal Operations Using Air Quality Criteria*, Chapter 2, in NATIONAL CENTER FOR MANURE AND ANIMAL WASTE MANAGEMENT WHITE PAPERS (Raleigh, NC: North Carolina State University, 2002).

34. Kenneth H. Matthews, Jr., *Antimicrobial Drug Use and Veterinary Costs in U.S. Livestock Production*, U.S. Department of Agriculture, Economic Research Service, Agricultural Information Bulletin 766 (2001), at 3.

35. Jane E. Brody, *Studies Find Resistant Bacteria in Meats*, N.Y. TIMES, Oct. 18, 2001, at A12.

36. *Id.*

37. Matthews, *supra* note 34, at 1; Kenneth H. Matthews, Jr., *Antimicrobial Resistance and Veterinary Costs in U.S. Livestock Production*, U.S. Department of Agriculture, Economic Research Service (2000), at 7.

38. *Id.*

39. Silvia Secchi & Bruce A. Babcock, *Pearls Before Swine? Potential Trade-offs Between the Human and Animal Use of Antibiotics*, 84 AM. J. AGRIC. ECON. 1279, 1284 (2002).

percent of the large cattle CAFOs and seventy percent of large swine operations administer antibiotics.[40] Evidence shows that the use of antibiotics is more prevalent at large CAFOs than at smaller AFOs.[41]

With antibiotics being used for animal production, scientists are concerned that antimicrobial resistance will become a major problem.[42] Preliminary data shows that poultry workers and growers from Delaware and Maryland are at higher risk that the general population to come into contact with bacteria that are antibiotic-resistant, possibly due to their work with animals receiving antibiotics.[43]

Concerns about antimicrobial resistance have led experts and governments to issue regulations to limit the use of antibiotics in livestock production. Due to the public concern about healthy food products, several Western European countries have acted to prohibit the use of antimicrobial drugs in feed to enhance growth or feed efficiency.[44] Similar action has been supported by the American Medical Association,[45] and the evidence has been noted by the U.S. Department of Health and Human Services as justifying changes in regulating the use of agricultural antibiotics.[46] Alternatively, other options have been suggested to reduce the use of antibiotics, including prescribing user fees, targeted bans, and protection of new antibiotics for human use only.[47]

5. Animal Welfare

The industrialization of animal production has caused people to express concern about the humane treatment of animals.[48] The confinement of animals without allowing social contact with others

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40. Animal and Plant Health Inspection Service, U.S. Department of Agriculture, *Antimicrobial Resistance Issues in Animal Agriculture* (1999), at 24.

41. *Id.*

42. *See* Tauxe, *supra* note 17, at 38; Lily Henning, *Antibiotics Fed to Poultry May Lead to Microbial Supermen*, DAILY RECORD (Baltimore), Feb. 8, 2003; Mike Toner, *Report: Farms Raising Germs' Resistance,* ATLANTA J. & CONST., Apr. 23, 2002, at 7A.

42. Henning, *supra* note 42.

44. David Brown, *Gains from Antibiotic Ban Noted: Benefits to Danish Farm Animals Come at 'Marginal' Cost*, WASH. POST, Mar. 27, 2002, at A11.

45. Robbin Marks, CESSPOOLS OF SHAME: HOW FACTORY FARM LAGOONS AND SPRAYFIELDS THREATEN ENVIRONMENTAL AND PUBLIC HEALTH (Washington, D.C.: Natural Resources Defense Council and Clean Water Network, 2001).

46. U.S. General Accounting Office, *Food Safety: The Agricultural Use of Antibiotics and Its Implications for Human Health*, GAO/RCED-99-74 (April 1999).

47. Paul E. McNamara & Gay Y. Miller, *Pigs, People, and Pathogens: A Social Welfare Framework for the Analysis of Animal Antibiotic Use Policy*, 84 AM. J. AGRIC. ECON. 1293, 1299 (2002).

48. *See* Ruth Payne, *Animal Welfare, Animal Rights, and the Path to Social Reform: One Movement's Struggle for Coherency in the Quest for Change* 9 VA. J. SOC. POL'Y & L. 587 (2002); Katharine M. Swanson, Note, *Carte Blanche for Cruelty: The Non-Enforcement of the Animal Welfare Act*, 35 U. MICH. J.L. REF. 937 (2002).

and the use of animals for experimentation is objectionable to many people.[49] While the appropriate treatment of animals commences with the elimination of harm or pain to an animal, value systems have expanded to include consideration on how animal production should take place.[50] This may include a focus on the moral value of individual creatures.[51]

People for the Ethical Treatment of Animals (PETA) have been successful in bringing examples of animal mistreatment to the public's attention and forcing corporations to alter their practices. McDonald's, Burger King, and Wendy's have ended criticized practices following intense pressure from PETA.[52] More serious ethical concerns exist about genetically modifying animals and using animals for testing new products.[53]

For AFOs, the question is whether animals are suffering.[54] Three production procedures may lead to a conclusion that there is excessive suffering: diets, lack of attention, and small confinement areas. These conditions have caused some to argue for a new ethic to address the welfare of confined animals.[55] In Florida, a group advocating the humane treatment of animals was successful in amending the state constitution in 2002 to ban the caging of pregnant sows.[56]

6. Loss of Resources

With our mechanized agricultural production, we may derogate existing rural resources.[57] Monocultures and dependence on artificial fertilizers threaten landscapes, future productivity, and soil resources.[58] CAFOs have replaced mixed animal and crop farms. With many animals confined in cages, pens, holding areas, and buildings, we no longer employ barnyards, meadows, and pastures that were prevalent during most of the last century. Few animals other than cattle are produced out-of-doors. Along

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49. John Hodges, *Why Livestock, Ethics and Quality of Life?*, in LIVESTOCK ETHICS AND QUALITY OF LIFE (John Hodges & In K. Han eds., New York: CABI Publishing, 1999), 1-26.

50. Jimena Uralde, Comment, *Congress' Failure to Enact Animal Welfare Legislation for the Rearing of Farm Animals: What is Truly at Stake?*, 9 U. MIAMI BUS. L. REV. 193 (2001).

51. *See* Eric Sundquist, *Environmentalists focus on species*, ATLANTA J. & CONST., Aug. 25, 2002, at 1Q.

52. Bruce Horowitz, *Wendy's Steps up Animal Welfare Standards*, USA TODAY, Sept. 6, 2001, at 2B.

53. *See* Chris M. Sherwin et al., *Guidelines for the Ethical Use of Animals in Applied Ethology Studies*, 81 APPLIED ANIMAL BEHAVIOUR SCI. 291 (2003).

54. *See* Uralde, *supra* note 50, at 197-202.

55. Ben Sutherly, *Activists Say Animals Endure Silent Suffering; Activists Label Megafarm Methods Cruel; But Farmers Argue Tactics are Humane*, DAYTON DAILY NEWS, Dec. 2, 2002, at 8A.

56. Tom Blackburn, *Hogging the Constitution*, PALM BEACH POST, Nov. 10, 2002, at 1E.

57. *See* Sandra B. Zellmer & Scott A. Johnson, *Biodiversity in and Around Mcelligot's Pool*, 38 IDAHO L. REV. 473 (2002).

58. *See* Michael R. Taylor, *The Emerging Merger of Agricultural and Environmental Policy: Building a New Vision for the Future of American Agriculture*, 20 VA. ENVTL. L.J. 169, 177 (2001).

with these production facilities has been the concentration of commercial producers in certain regions and states. We have a lot of animals aggregated in a few areas, accompanied by the demise of animal production in most regions of the country.

The production of multiple crops and animals on the classic family farm involved landscapes quite different from today's countryside. Farmers who fed some of their feed grains to their own livestock raised several crops. This allowed them to use some fields for relatively soil-conserving crops such as wheat, oats, and barley, and other fields for more intensive row crops like soybeans and corn.[59] The production of animals provided manure for use on fields that were deficient in nutrients. Farms had pastures and meadows for hay production. Such production practices employed the byproducts of livestock production to improve soils and provided diverse landscape.

When manure was returned to fields at individual farms, it improved the soils by expanding the soil's capacity for holding water and retaining nutrients. Today, most farms apply commercial fertilizers rather than manure to secure additional nutrients for plant growth. These fertilizers provide adequate nutrients but lack organic matter and micro-nutrients important for long-term sustainable production. Without adequate organic matter, soils have inferior physical characteristics and a diminished ability to support beneficial soil organisms.[60]

The amalgamation of fields has meant that cropping monocultures have replaced the former checkerboard of fields of assorted crops. Large scale agricultural production has made it more economical to raise one or two crops, the same crops raised by neighboring farmers. Former pastures and hayfields have reverted to woodlands or been incorporated into row crop production.[61] In areas of intensive row crop production, the dearth of required food and habitat means that birds and insects are missing. Grassland and shrub-land nesting birds have suffered significant declines.[62] Our fixation on protecting deer has meant that, in some areas, large numbers are threatening plant species and removing vegetation necessary for suitable nesting sites for bird species. Agricultural practices are harming native varieties and eliminating diversity.

C. Questions with the Evidence

While the environmental problems accompanying production of animals are troublesome, the implementation of appropriate responses is challenging. Governments have difficulties in devising regulations that incorporate desired scientific principles. Expenses that accompany environmental regulations may cause producers to be less competitive. Sometimes, regulations force producers out of business.[63] Therefore, producers generally prefer to voluntarily adopt practices to keep pollutants out

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59. Clive Potter, AGAINST THE GRAIN: AGRI-ENVIRONMENTAL REFORM IN THE UNITED STATES AND THE EUROPEAN UNION (Wallingford, UK: CAB International 1998), at 21-22.

60. David Chaney, Laurie Drinkwater, & Stuart Pettygrove, *Organic Soil Amendments and Fertilizers* (University of California Sustainable Agriculture Research and Education Program, Oakland, CA, 1992), at 3-5.

61. R.A. Askins, *Population Trends in Grassland, Shrubland, and Forest Birds in Eastern North America*, 11 CURRENT ORNITHOLOGY 1, 10 (1993).

62. *Id.* at 2 & 9.

63. The new federal regulations are expected to cause 385 producers to be vulnerable to closure. EPA CAFO Regulations, *supra* note 3, at 7246.

of water. However, the inability of voluntary measures to achieve desired water quality has led governments to resort to more exacting regulatory controls to address pollutant problems.

Given existing voluntary best management practices and restrictions by state governments, many producers feel that more expansive federal regulations are not needed. An analysis of the data listed as supporting the new federal CAFO regulations discloses that the government relied on old data, incomplete accountings by states, and partial data.[64] The absence of conclusive data suggests that regulatory compromises may be appropriate.

1. Old Data

The data employed to justify the new regulations were collected by state governments for the 1998 report of the *National Water Quality Inventory*.[65] The data were presumably collected up to five years prior to the state reports, but the *National Inventory* notes that forty-five percent of the data were more than five years old.[66] Some data may have been collected in the early 1990s, or even in the late 1980s.

Justifying new CAFO regulations through data collected approximately ten years ago is difficult given the many changes that have occurred with respect to livestock production. The major issue is that the data do not accurately reflect the quality of current water conditions. Data showing impaired waters in the 1990s does not mean the same waters are impaired today because the location, activities, and practices of AFOs have changed significantly in the past ten years.

The documentation for the new rules admits that AFOs have changed markedly in size and location since the early 1990s.[67] Producers are fewer in number and have larger operations. For example, the 1992 Census showed 191,347 hog farms in 1992[68] but only 114,380 operations were noted in 1998.[69] It may be surmised that one-fourth of the AFOs generating potential pollutants in the early 1990s are no longer in business.[70] Given the changes in the size and location of AFOs, data from the early 1990s may not represent current pollution problems. Where AFOs have grown in size, pollution may be worse; where they have gone out of business, pollution may be less.

Another question concerning the data used to support the new regulations concerns the regulation of manure by state governments. An analysis of the state administrative rules governing animal wastes

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64. Terence J. Centner, *Establishing a Rational Basis for Regulating Animal Feeding Operations: A View of the Evidence*, 27 VT. L. REV. 115 (2002).

65. *National Inventory*, *supra* note 7, at Executive Summary 2.

66. *Id.* at 52.

67. EPA Proposed Rule, *supra* note 2, at 2972.

68. National Agricultural Statistics Service, U.S. Department of Agriculture, *1992 Census of Agriculture*, Volume 1: Part 51, Chapter 1, United States Summary and State Data National-Level Data, Historical Highlights: 1992 and Earlier Census Years, http://www.nass.usda.gov/census/census92/volume1/us-51/toc92.htm.

69. National Agricultural Statistical Service, U.S. Department of Agriculture, AGRICULTURAL STATISTICS 1999 (1999), at VII-19.

70. Centner, *supra* note 64, at 126.

in the six states with the largest numbers of beef cows, hogs, dairy cows, and chickens shows that all of these rules have been revised or expanded in the past few years.[71] State legislative efforts between 1994 and 1998 show a trend toward more stringent animal manure management legislation that should reduce pollutants from AFOs.[72] It is possible that state governments have already responded to much of the reported pollution observed in the data employed to support the new federal regulations.

2. Incomplete Accounting by States

Not every state reported data in the *National Inventory*. Data concerning whether agriculture impaired water quality came from twenty states.[73] Are these data representative of the thirty states that failed to report their own information? Perhaps the data from the *National Inventory* underestimate the impairment of waters by animals.[74]

At the same time, the data may overestimate the impairment because so many AFOs that were operating in the early 1990s are no longer in business. It is difficult to know whether the data fairly represent the sources of impairment of our country's water resources. If the states reporting the data have state AFO regulations that are either more or less stringent than the states not reporting, the data may not be representative. Given that many livestock producing states have adopted more stringent AFO regulations, the possibility exists that the data may overestimate water impairment.

3. Partial Data from Reporting States

The supporting data for the new regulations were gathered from twenty-three percent of the assessed river mileage, which were subsequently assumed to be representative of all other rivers.[75] This means that more than three-fourths of our country's river miles were never assessed for the data employed to justify the assumption that AFOs are a major source of water pollutants. Only seventeen states were listed as reporting that they had rivers and streams impaired by AFOs.[76] The data from these states may not accurately represent pollution from AFOs.

Nutrient pollution from AFOs is alleged to be one of the primary sources of water impairment.[77] Based on information from sixteen states,[78] it was noted that AFOs are estimated to affect four percent

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71. *Id.* at 126-127.

72. Metcalfe, *supra* note 5.

73. *National Inventory*, *supra* note 7, at Appendix A-3f.

74. *Id.*

75. *Id.*

76. *Id.* at Appendix A-4.

77. EPA Proposed Rule, *supra* note 2, at 2976.

78. Office of Water, Environmental Protection Agency, *Environmental Assessment of Proposed Revisions to the National Pollutant Discharge Elimination System Regulation and the Effluent Guidelines for Concentrated Animal Feeding Operations*, EPA 821-B-01-001 (Jan. 2001).

of our country's lakes, ponds, and reservoirs impaired by agriculture.[79] Only eight states had reported phosphorus and nitrogen pollution in the *National Inventory.*[80] How should these data be reconciled with concern about phosphorus pollution from AFOs?

Equally significant is the quantity of the data reported by states in the *National Inventory*.[81] California and Texas reported data, but it came from only eight percent and seven percent of their river miles, respectively.[82] With no data from over ninety percent of the river miles in these two states, it is difficult to infer meaningful pollution statistics. The incomplete data reporting water impairment by AFOs may not justify the conclusions adopted by the government in formulation of the new federal regulations.

D. Voluntary Efforts

Agricultural producers have long employed conservation measures in the form of best management practices (BMPs) to reduce pollution from their operations. BMPs generally refer to practices determined to be the most effective practical means for preventing pollution or reducing pollutants to levels compatible with water quality goals. Many BMPs minimize water pollution through the application of conservation principles that are ecologically sound.

As methods, measures, and practices that may be used to reduce or eliminate pollutants from waters, BMPs do not supersede state water quality standards. Whenever society feels that too many pollutants are entering public waters, they can petition governments for new regulatory controls. This means that the increased use of BMPs may decrease the need for governmental regulations. With guidance from Cooperative Extension Service specialists, farmers have learned about and implemented BMPs to reduce agricultural contamination and lessen the likelihood of additional regulations.

1. Nutrient Management Plans

One of the major methods to reduce animal waste pollution is to employ a nutrient management plan to meet environmental objectives.[83] Many states have developed nutrient and manure management regulations to help protect water quality, enhance crop performance, and reduce conflicts with others. Nutrient management plans address feed management, manure handling and storage, land application of manure, land management, record keeping, and management of other waste utilization options.[84] After considering the pertinent information, a nutrient management plan is developed that will implement

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79. *Id.* at 4-2.

80. *National Inventory*, *supra* note 7, at Appendix A-4.

81. The percentage of stream miles that were assessed is noted for individual states. *Id.* at Appendix A-1.

82. *Id.* at Appendix A-1.

83. Douglas B. Beegle, O.T. Carton, & J.S. Baily, *Nutrient Management Planning: Justification, Theory, Practice*, 29 J. ENVTL. QUALITY 72, 72 (2000).

84. Office of Wastewater Management, U.S. Environmental Protection Agency, *Draft Guidance Manual and Example NPDES Permit for Concentrated Animal Feeding Operations—Review Draft* (October 20, 1999), at § 3.1.1 [*Draft Guidance Manual*].

management practices to protect water quality and public health. Producers can eliminate some nutrient contamination by following the practices listed in their plan.

For AFOs, nutrient management plans are used to limit applications of manure so that excess nutrients are not applied to fields.[85] Producers calculate the nutrients in the manure and the soil and figure the amounts required for optimal crop production. With this information, they can determine the amounts of manure to apply to individual fields so that applications of nitrogen and phosphorus are limited to recommended rates. What this usually means for the application of manure is that a producer can only apply a quantity required to reach the recommended amount of phosphorus.[86] Commercial fertilizer would be used to alleviate any deficiencies in remaining nutrients.

The development and implementation of nutrient management plans are the responsibility of the facility operator.[87] Technical assistance for developing plans is available from federal agencies. Operators can also receive assistance from private consultants, integrators, industry associations, and qualified vendors.[88] The U.S. Department of Agriculture's Natural Resources Conservation Service Field Office Technical Guide (1990) is the primary technical reference for the development of nutrient management plans.[89] Under the new federal regulations, all permitted CAFOs are required to develop and implement a nutrient management plan.[90]

2. Conservation Buffers

Conservation buffers include riparian buffers, filter strips, grassed waterways, contour grass strips, hedgerows, field borders, and alley cropping.[91] These voluntary BMPs have been afforded special recognition by various congressional legislation and programs since the 1930s. Recently, two programs have offered assistance to landowners for the implementation of buffer practices. The USDA's Environmental Quality Incentives Program delineates land management and vegetative and structural methods involving conservation buffer practices that qualify for financial assistance.[92] This program may

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85. Rick Koelsch & Gary Lesoing, *Nutrient Balance on Nebraska Livestock Confinement Systems*, 77 J. ANIMAL SCI. 63 (Supp. 1999).

86. J.T. Sims et al., *Integrating Soil Phosphorus Testing into Environmentally Based Agricultural Management Practices*, 29 J. ENVTL. QUALITY 60 (2000).

87. U.S. Department of Agriculture and U.S. Environmental Protection Agency, *Unified National Strategy for Animal Feeding Operations* (Mar. 9, 1999), at §§ 3.4, 4.1.

88. *Draft Guidance Manual*, *supra* note 84, at § 3.1.2.

89. Natural Resources Conservation Service, U.S. Department of Agriculture, FIELD OFFICE TECHNICAL GUIDE (National Handbook of Conservation Practices, 1990) [FIELD OFFICE GUIDE].

90. EPA CAFO Regulations, *supra* note 3, at 7268 (to be codified at 40 C.F.R. § 122.42(e)).

91. *See* Terence J. Centner, *Concentrated Animal Feeding Operations: Employing Conservation Buffers and Setbacks to Ameliorate Negative Externalities*, 25 COLUM. J. ENVTL. L. 220 (2000).

92. 16 U.S.C.. §§ 3839aa-1 to 3839aa-8.

cost-share up to seventy-five percent of the costs of certain conservation practices.[93] The Conservation Reserve Enhancement Program lends assistance to states in addressing specific state or national water quality or soil erosion issues.[94] The federal-state programs respond to the specific issue with financial incentives for farmers to take land out of agricultural production.[95]

Riparian buffers remove sediment and suspended solids from surface-water runoff. Plants may take up nutrients and sequester them in plant tissues. Riparian buffers can also transform toxic chemicals into nontoxic forms due to microbial decomposition, oxidation, reduction hydrolysis, solar radiation, and other biodegrading forces.[96] Wetlands may also serve as a riparian buffer by removing sediments and nutrients from drainage water.[97] A wetland simulation model concluded that wetlands can remove seventy-nine percent of the nitrogen and phosphorus in drainage waters from an agricultural area.[98] Plants and animals take up these nutrients so that some nutrients can exit the site.

Governments can establish riparian buffers that preclude livestock owners from allowing their animals to graze next to some streams. Such buffers can safeguard our natural resources and prevent pollution. The absence of regulations requiring riparian buffers does not preclude fencing animals out of vulnerable areas such as streams. Many farmers have voluntarily adopted this stewardship practice. Farmers have also embraced filter strips to preserve their soil resources. These consist of perennial vegetation located downslope from cropland so that water moving on the surface or shallow groundwater will come into contact with the vegetation.[99] Filter strips improve water quality by removing sediment, organic material, and other pollutants from runoff. This may include the removal of nutrients from animal waste that are in shallow groundwater passing through the strip.[100]

3. Pasture Management

Animal producers with pastures and grazing areas have choices involving the selection of plant species, stocking rates, nutrient application, control of weeds, and grazing management practices. These may be called pasture management techniques. Pasture management may include restricting livestock from water and preventive measures to keep pesticides, fertilizers, animal manures, and other pollutants

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93. Natural Resources Conservation Service, U.S. Department of Agriculture, *Environmental Quality Incentives Program*, *available at* http://www.nrcs.usda.gov/programs/eqip.

94. 16 U.S.C.A. § 3834.

95. Farm Service Agency, U.S. Department of Agriculture, *Conservation Reserve Enhancement Program*, http://www.fsa.usda.gov/dafp/cepd/crep.htm.

96. David J. Welsch, *Riparian Forest Buffers: Function and Design for Protection and Enhancement of Water Resources*, U.S. Department of Agriculture, Forest Service, Northeastern Area, NARR-07-91 (1991).

97. A.J. Castelle, A.W. Johnson, & C. Connolly, *Wetland and Stream Buffer Size Requirements-A Review*, 23 J. ENVTL. QUALITY 878 (1994).

98. G.M. Cheschir et al., *Evaluation of Wetland Buffer Areas for Treatment of Pumped Agricultural Drainage Water*, 35 TRANSACTIONS AM. SOC. AGRIC. ENGINEERS 175 (1992).

99. *See* FIELD OFFICE GUIDE, *supra* note 89, at Filter Strip.

100. *See* S.K. White et al., *The Use of Fertilizer-Free Grass Buffer Strips to Attenuate Nitrate Input to Marshland Dykes,* 12 WATER & ENVTL. MGMT. 54, 59 (1998).

out of water. Other management techniques may assist in the control of weeds[101] and the preservation of native vegetation and habitats.[102]

The most important management tool is to avoid overgrazing that depletes or harms the grazing resource.[103] Research has shown that overgrazing may have deleterious effects on the biotic community and the long-term productivity of the resource. A common problem with overgrazing is that it can deplete certain plants, resulting in inferior species and reduced quantities of herbage.[104] A rotation program, or management of the timing or season of grazing, may be used to control this problem.[105] Pasture management may prevent the destruction of vegetation by livestock meandering near water sources and minimize adverse effects of livestock on fish habitats and sport activities.[106]

4. Stream and Waterbody Protection

A BMP practice called stream and waterbody protection involves practices and preventive measures to deter pollutants and sediment from entering streams and waterbodies. Structural measures for fencing cattle out of streams, construction of culverts, development of sediment basins, creation of alternative water sources for livestock, and agro-forestry practices to reduce nutrient mobility can be important in reducing pollutants from entering waterbodies.

Environmental groups have sought more protection of streams to protect coldwater fish species.[107] In an Oregon lawsuit, it was argued that grazing along streams often blocks the reproduction of black cottonwood and willow stands in a riparian zone, thereby eliminating trees that supply shade to streams.[108] In the absence of shade trees and other riparian vegetation, a stream's water temperature may exceed the allowable maximum standard established for the protection of native coldwater fish.[109] Fences and other measures to exclude domestic animals from grazing in riparian zones may have significant benefits for native plant and fish populations.

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101. *See* M. Hams, *Pasture Management and Productivity in Practice: The Rangelands*, *in* PASTURE MANAGEMENT (David R. Kemp & David L. Michalk eds., 1994), at 133.

102. *See* C.J. Pearson & R.L. Ison, AGRONOMY OF GRASSLAND SYSTEMS, New York: Cambridge University Press (1987), at 102.

103. *See* Hams, *supra* note 101, at 130-136.

104. *Id.* at 56.

105. *Id.*

106. John F. Vallentine, RANGE DEVELOPMENT AND IMPROVEMENTS (San Diego: Academic Press, Inc., 1989).

107. *See* Oregon Measure 38, Prohibits Livestock in Certain Polluted Waters or on Adjacent Lands (1996).

108. Oregon Natural Desert Ass'n v. Bureau of Land Management, 953 F. Supp. 1133 (D. Or. 1997).

109. *Id.* at 1145.

Other research suggests that in some instances keeping animals out of streams is not optimal. Streams in some forested landscapes have more erosion than streams with grassy banks.[110] This suggests that maintaining grass next to some streams may be preferred to fences that completely exclude livestock. Favorable results from grazing next to streams will no doubt require controlled grazing where animals are excluded from the areas next to the stream except for carefully selected times.[111] Such findings show the difficulties in prescribing agronomic practices or proscribing activities. Rather than mandating definitive practices, further efforts may be needed to work with farmers in developing their capacity to adopt voluntary BMPs suitable for their individual farms.

E. Clean Water Act Controls

The major federal regulation concerning animal-waste pollution is the Clean Water Act that establishes national thresholds for attaining water quality that protects fish and wildlife and providing for recreation.[112] Another goal is to develop and implement programs for the control of pollution sources. These goals are structured in a framework whereby the states can have the primary responsibility to prevent, reduce, and eliminate water pollution. Federal agencies work with state and local agencies to develop solutions for managing water resources and reducing pollution.

The federal Clean Water Act establishes two classifications for water pollutants: point sources and nonpoint sources.[113] CAFOs are listed under the Act's definition of point sources[114] as AFOs that have additional characteristics concerning numbers of animals at a single facility and discharges of pollutants.[115] AFOs that are not CAFOs are not regulated under the Clean Water Act's permitting provisions.

The consideration of CAFOs begins with defining what animal production facilities are AFOs. An AFO is an animal production operation that confines and feeds animals for a total of forty-five days or more during any twelve-month period.[116] In addition, the animals must prevent vegetative forage growth from surviving the normal growing season over a portion of the confined area.[117] Given these requirements, a facility where animals are not confined and fed for at least forty-five days, or where vegetation survives in the confined area is not considered to be an AFO under federal law. This means that ranches where

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110. Brian A. DeVore, *When Farmers Shut Off the Machinery*, in THE FARM AS A NATURAL HABITAT: RECONNECTING FOOD SYSTEMS WITH ECOSYSTEMS (Dana L. Jackson & Laura L. Jackson eds., Washington, D.C.: Island Press, 2002), at 94.

111. *Id.*

112. 33 U.S.C.. § 1251.

113. *Id.*

114. *Id.* § 1362(14).

115. EPA CAFO Regulations, *supra* note 3, at 7265-66 (to be codified at 40 C.F.R. § 122.23).

116. *Id.* at 7265 (to be codified at 40 C.F.R. § 122.23(b)(1)).

117. *Id.*

thousands of animals graze outdoors rather than being fed in confined quarters are not AFOs. Since a CAFO must also be an AFO, such ranches are not governed by CAFO regulations.

1. Size of Operations Regulated

CAFOs have long been regulated under a three-tier system based on the numbers of animals present at a facility and sometimes on other factors relating to the probability of a discharge.[118] After considering several alternatives, the EPA elected to keep the existing three-tier system for defining CAFOs in its new regulations.[119] With the three-tier system, states would be in a better position to continue with current regulatory efforts.

Three categories of CAFOs are defined by the three-tier system: large, medium, and small CAFOs. Large CAFOs, based entirely on the number of animals at a facility, have as many or more of the following numbers of animals:

(i) 700 mature dairy cows, whether milked or dry;
(ii) 1,000 veal calves;
(iii) 1,000 cattle other than mature dairy cows or veal calves. Cattle includes but is not limited to heifers, steers, bulls and cow/calf pairs;
(iv) 2,500 swine each weighing 55 pounds or more;
(v) 10,000 swine each weighing less than 55 pounds;
(vi) 500 horses;
(vii) 10,000 sheep or lambs;
(viii) 55,000 turkeys;
(ix) 30,000 laying hens or broilers, if the AFO uses a liquid manure handling system;
(x) 125,000 chickens (other than laying hens), if the AFO uses other than a liquid manure handling system;
(xi) 82,000 laying hens, if the AFO uses other than a liquid manure handling system;
(xii) 30,000 ducks (if the AFO uses other than a liquid manure handling system); or
(xiii) 5,000 ducks (if the AFO uses a liquid manure handling system).[120]

The CAFO regulations further prescribe some requirements only for large CAFOs, such as governing manure, litter, and process wastewater transferred to other persons.[121] The recipient of such a product from a large CAFO must be provided a nutrient analysis.[122] Moreover, many of the requirements of the effluent limitations guidelines only apply to large CAFOs.[123]

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118. *Id.* (to be codified at 40 C.F.R. § 122.23).

119. *Id.* at 7190.

120. *Id.* at 7265-66 (to be codified at 40 C.F.R. § 122.23(b)(4)).

121. *Id.* at 7268 (to be codified at 40 C.F.R. § 122.42(e)(3)).

122. *Id.*

123. *Id.* at 7271 & 7273 (to be codified at 40 C.F.R. §§ 412.30, 412.40).

Medium CAFOs are facilities with fewer animals that discharge pollutants into waters of the United States.[124] Small CAFOs are those designated as a CAFO by the appropriate governmental authority. Designation is made after an on-site inspection and only if an AFO is a significant contributor of pollutants to waters.[125]

2. Potential Pollutants

Four categories of potential pollutants are discussed in the regulations: manure, litter, process wastewater, and overflows. Under the CAFO regulations, NPDES permits apply to all manure, litter, and process wastewater generated by animals or the production of animals at an operation.[126] Manure is defined to cover the expected wastes and bedding materials.[127] Litter is not defined but means poultry droppings mixed with shavings or other absorbent material.[128] Process wastewater is defined as

> spillage or overflow from animal or poultry watering systems; washing, cleaning, or flushing pens, barns, manure pits, or other AFO facilities; direct contact swimming, washing, or spray cooling of animals; or dust control . . . [and] also includes any water which comes into contact with any raw materials, products, or byproducts including manure, litter, feed, milk, eggs or bedding.[129]

By defining process wastewater to cover these uses of water and placing process wastewater within the regulated pollutants, the CAFO regulations regulate waters used at a CAFO in the same manner as animal waste.

Overflow is defined to cover the discharge of manure or process wastewater due to the inability of a storage structure to contain the material.[130] Overflow exceptions based on chronic or catastrophic rainfall events allow discharges in limited situations.[131]

3. Production Areas

The NPDES permit requirements for CAFOs apply with respect to all animals in confinement at a facility and all manure, litter, and process wastewater generated by those animals or the production of those animals.[132] The federal regulations define production areas to include animal confinement areas,

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124. *Id.* at 7266 (to be codified at 40 C.F.R. § 122.23(b)(6)).

125. *Id.* (to be codified at 40 C.F.R. § 122.23(c)).

126. *Id.* at 7265 (to be codified at 40 C.F.R. § 122.23(a)).

127. *Id.* at 7266 (to be codified at 40 C.F.R. § 122.23(b)(5)).

128. *Id.* at 7191 (noting that the new CAFO rules apply to dry litter chicken operations).

129. *Id.* at 7266 (to be codified at 40 C.F.R. § 122.23(b)(7)).

130. *Id.* at 7269 (to be codified at 40 C.F.R. § 412.2(g)).

131. *Id.* at 7269-71 (to be codified at 40 C.F.R. §§ 412.12, 412.13, 412.15).

132. *Id.* at 7265 (to be codified at 40 C.F.R. § 122.23(a)).

manure storage areas, raw materials storage areas, and waste containment areas.[133] Further provisions define each of the four enumerated areas.[134] Under these provisions, the production area includes feed silos, silage bunkers, bedding materials, berms, egg washing, egg processing, and mortality areas.[135]

The final CAFO regulations distinguish production areas from land application areas, and the two areas are subject to different effluent discharge limitations. In general, there can be no discharge of process waste water pollutants to navigable waters from an existing production area except when either chronic or catastrophic rainfall events cause an overflow of process waste water from a facility designed and operated to contain all process-generated waste waters plus the runoff from a ten-year, twenty-four-hour rainfall event. On the other hand, as to land application areas controlled by the CAFO, discharges are only subject to the requirement that best management practices be developed, implemented, and documented. In other words, a numerical pollutant limit does not apply to land application areas as it does to production areas.

4. Land Application Areas

In developing the revised CAFO regulations, the EPA recognized that to control pollution from CAFOs, some type of regulation of the land application of manure was needed. The significance of this type of pollution had been highlighted in a lawsuit over pollution from a dairy operation. In *Concerned Area Residents for the Environment v. Southview Farms*, the Second Circuit Court of Appeals noted that manure channeled from a field into a swale coupled with a pipe at a CAFO constituted a discharge from a point source.[136] Thus, this was a discharge regulated by the Clean Water Act.

Under the new federal regulations, a separate definition is prescribed for a land application area as land under the control of an AFO owner or operator, whether it is owned, rented, or leased, to which manure, litter or process wastewater from the production area is or may be applied.[137] The regulations then proceed to require that any discharge of manure, litter, or process wastewater on lands under the control of a CAFO is subject to NPDES permit requirements.[138]

5. Agricultural Storm Water Discharges

One of the controversies regarding the regulation of CAFOs has been the application of the agricultural storm water discharge exclusion provided by the Clean Water Act.[139] Producers have maintained that this longstanding regulatory exemption means that runoff from the application of manure

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133. *Id.* at 7266 & 7269 (to be codified at 40 C.F.R. §§ 122.23(b)(8), 412.2(h)).

134. *Id.* at 7266 (to be codified at 40 C.F.R. § 122.23(c)(8)).

135. *Id.*

136. Concerned Area Residents for the Environment v. Southview Farms, 34 F.3d 114, 118 (2d Cir. 1994).

137. EPA CAFO Regulations, *supra* note 3, at 7265 (to be codified at 40 C.F.R. § 122.23(b)(3)).

138. *Id.* at 7267 (to be codified at 40 C.F.R. § 122.23(e)).

139. 30 U.S.C. § 1362(14).

cannot be regulated under the CAFO regulations.[140] With the explicit provisions on land application areas, the new regulations regulate discharges that may accompany manure application.[141] The response addresses the impairment of water quality while deferring to the agricultural storm water discharge exclusion.

If manure, litter, or process wastewater is applied in accordance with site-specific nutrient management practices, any discharge resulting from a rainfall event will be deemed as agricultural storm water discharge.[142] In these situations the producer applies manure, litter or process wastewater in a manner to ensure appropriate agricultural utilization of the nutrients so that the application is intended as a production input. Discharges from such applications continue to be excluded from point-source pollution controls by the agricultural storm water discharge exclusion.[143]

However, what if a discharge occurs from a CAFO's land application area because manure and process wastewater were *not* applied in accordance with site-specific nutrient management practices to ensure appropriate agricultural utilization of the nutrients? If this occurs, the discharge is not an agricultural storm water discharge and is therefore subject to CAFO limitations.[144] Only discharges that occur despite the use of site-specific management practices to ensure appropriate agricultural utilization of the nutrients in manure, litter, and process wastewater are excused by the agricultural storm water discharge exclusion. All other discharges of manure, litter or process wastewater are governed by the CAFO regulations because they are point-source discharges and are subject to NPDES permit requirements.

6. Effluent Limitations Guidelines

One of the issues that the new regulations thoroughly cover is best management practices for land application of manure, litter, and/or process wastewater.[145] Separate provisions exist for four categories of animals: (1) horses and sheep, (2) ducks, (3) dairy cows and cattle other than veal calves, and (4) swine, poultry, and veal calves.[146] Different technological requirements are prescribed for CAFO production areas, CAFO land application areas, and for new sources.

The new regulations seek to insure the proper application of manure, litter, and process wastewater to land under the control of those large CAFOs that are likely to be employing land application practices. Thus, with the exception of ducks, horses, and sheep, further land application guidelines apply to large CAFOs.[147] They are required to prepare and implement nutrient management plans based upon

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140. EPA CAFO Regulations, *supra* note 3, at 7196.

141. *Id.* at 7197-98.

142. *Id.*

143. *Id.* at 7267-68 (to be codified at 40 C.F.R. § 122.23(e)).

144. *Id.* at 7197-98.

145. *Id.* at 7269-74 (to be codified at 40 C.F.R. part 412).

146. *Id.*

147. *Id.* at 7272-73 (to be codified at 40 C.F.R. §§ 412.31(b), 412.43(b)).

a field-specific assessment of the potential for nitrogen and phosphorus transport from the field.[148] Permittees must use technical standards in determining application rates for manure, litter, and process wastewater applied to land that minimize the movement of nitrogen and phosphorus to surface waters.[149] Permittees should conduct annual analyses of manure for nitrogen and phosphorus content and analyze soils at least once every five years for phosphorus content.[150] Application rates are to incorporate the results of these analyses.[151]

The regulations also establish setback requirements for the application of manure, litter, and process wastewater.[152] Regulated CAFOs cannot apply these materials within 100 feet of any down-gradient surface waters, open tile line intake structures, sinkholes, agricultural well heads, or other conduits to surface waters.[153] An alternative compliance measure using a thirty-five-foot vegetated buffer is possible.[154] For other situations, a CAFO may be able to demonstrate to the permitting authority that a setback or vegetated buffer can be reduced or even is unnecessary.[155]

The new regulations specify that a nutrient management plan must include best management practices and procedures necessary to implement applicable effluent limitations and standards.[156] CAFOs are also required to make an annual report to the State Director (or a regional administrator) and to keep records for five years.[157]

7. TMDL Requirements

Section 303(d) of the Clean Water Act sets forth provisions whereby polluted waters that fail to meet established water quality standards must be listed and a total maximum daily load (TMDL) program developed.[158] Through a TMDL program, pollution sources may be required to reduce pollutant loads, thereby providing for the improvement of water quality. Citizens have attempted to use the TMDL

148. *Id.* at 7270 (to be codified at 40 C.F.R. § 412.4(c)(1)).

149. *Id.* (to be codified at 40 C.F.R. § 412.4(c)(2)).

150. *Id.* (to be codified at 40 C.F.R. § 412.4(c)(3)).

151. *Id.*

152. *Id.* (to be codified at 40 C.F.R. § 412.4(c)(5)).

153. *Id.*

154. *Id.*

155. *Id.*

156. *Id.* at 7268-69 (to be codified at 40 C.F.R. § 122.42(e)).

157. *Id.*

158. 33 U.S.C. § 1313(d).

requirements in their efforts to reduce water pollution. Since the early 1990s, numerous citizen lawsuits have forced more than one-half of the states to prepare section 303(d) lists of impaired waters.[159]

For their TMDL programs, states identify waters that are impaired and list water quality-limited segments. A TMDL is established for each listed water quality-limited segment of a river or waters, and a prioritized list and TMDLs are submitted to the EPA for review. Under the regulatory framework, the EPA either approves or disapproves of the prioritized list and TMDLs. When the EPA approves a state listing and TMDLs, the state proceeds to incorporate them into its continuing planning process.[160] The TMDL regulations thereby require states to act, and if a state fails to act, the EPA is expected to employ a continuing planning process that would incorporate TMDLs to meet water quality standards.

TMDLs are implemented through NPDES permits, nonpoint source programs, and other laws and requirements. They may result in stricter federal permits for existing facilities and bans against expansion. New facilities may be prohibited from obtaining federal discharge permits or may be forced to obtain an offset. Experts see the TMDL program as another mechanism to address the continued pollution of our waters.[161]

While some agricultural and forestry groups have maintained that TMDLs were not intended to cover nonpoint-source pollution,[162] a California case found that nonpoint-source pollution needs to be considered in the state's continuing planning process for TMDLs.[163] The court reasoned that the mandatory planning process required the incorporation of TMDLs and their application to nonpoint sources of pollution.[164] Employing TMDLs to reduce pollutants entering public waters without considering nonpoint-source pollutants would frustrate Congress' mandate to protect our nation's water quality through a set of water-quality standards for all navigable rivers.[165]

F. Administration and Enforcement

The federal government has assigned enforcement responsibilities over CAFOs to states, but some of the available evidence suggests that it has not provided the oversight necessary to ensure that the states carry out the laws.[166] The EPA reported that only about twenty percent of the nation's CAFOs had

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159. Oliver A. Houck, THE CLEAN WATER ACT TMDL PROGRAM: LAW, POLICY, AND IMPLEMENTATION, (Washington, D.C.: Environmental Law Institute, 2000), at 76.

160. 33 U.S.C. § 1313(e).

161. Michael M. Wenig, *How 'Total' are 'Total Maximum Daily Loads'? - Legal Issues Regarding the Scope of Watershed-Based Pollution Control Under the Clean Water Act*, 12 TULANE ENVTL. L.J. 87 (1998).

162. Jim Boyd, *Unleashing the Clean Water Act: The Promise and Challenge of the TMDL Approach to Water Quality*, 139 RESOURCES 7 (Spring 2000).

163. Pronsolino v. Marcus, 91 F. Supp.2d 1337, 1344 (N.D. Cal. 2000).

164. *Id.* at 1345.

165. *Id.* at 1356.

166. Terence J. Centner & Jeffrey D. Mullen, *Enforce Existing Animal Feeding Operations Regulations to Reduce Pollutants*, 16 WATER RESOURCES MGMT. 133 (2002); Jeffrey D. Mullen & Terence

secured permits in 1997.[167] With inadequate resources and limited numbers of personnel, many states are unable to meet their enforcement responsibilities. In a few cases, political and economic pressures have also meant that enforcement is lax. Given these conditions, AFOs may be able to violate regulatory provisions without incurring fines or other sanctions.

The enactment of additional CAFO regulations will increase states' regulatory burdens.[168] In the absence of additional resources, and because states have yet to fully implement previous regulations, the General Accounting Office exhorted greater oversight of state programs.[169] Problems are anticipated in carrying out the increased responsibilities without additional staffing.[170]

The need for additional regulations over CAFOs might be obviated if enforcement efforts are enhanced and producers are compelled to comply with current regulations. One option is to increase resources for noncompliance monitoring and detection efforts. If additional resources are committed to noncompliance monitoring and detection, states must be willing to issue sanctions. Detecting violations without penalties may not deter persons from foregoing compliance with CAFO regulations.

One enforcement difficulty involves the diffusion of CAFO enforcement authority across state and federal agencies. This occurs because the administrative agency detects violations but a separate prosecutorial agency must initiate enforcement actions. Efforts of administrative agencies may be wasted if prosecutorial agencies fail to carry through with their compliance efforts and levy sanctions. Endeavors to help an administrative agency gain a clear understanding of the prosecutorial agency's willingness to prosecute specific violations may allow the administrative agency to direct its resources toward detecting and referring those violations most likely to be enforced.

Current practices of not enforcing regulations may be accompanied by noncompliance and prohibited pollutants entering waterbodies. This dilutes the effectiveness of the regulations in reducing pollution. With an increase in the number of regulated CAFOs under the new federal regulations, an unintended consequence may be a decrease in the likelihood that violators will be detected. The increase in the number of regulated firms means it is less likely that administrators will find an individual CAFO that is not in compliance. Given this possibility, rather than relying on additional regulations to achieve reductions of pollutants, modest increases of resources into enforcement efforts offer an alternative option for addressing pollution problems. Governments might consider whether greater enforcement efforts, rather than regulating more firms, offer superior strategies for responding to pollution problems.

G. Conclusion

The production of animals is accompanied by practices that are quite different from those that traditionally occurred on family farms. With concentrations of animals, quantities of manure are produced

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J. Centner, *Impacts of Regulatory Adjustments with Diffuse Enforcement Authority: CAFOs, AFOs, and Environmental Quality*, 25 REV. AGRIC. ECON. (forthcoming in 2003).

167. EPA Proposed Rule, *supra* note 2 at 2984, 3080.

168. U.S. General Accounting Office, *Livestock Agriculture: Increased EPA Oversight Will Improve Environmental Program for Concentrated Animal Feeding Operations*, GAO-03-285 (Jan. 2003).

169. *Id.* at 14.

170. *Id.* at 15.

that need to be disposed of responsibly to avoid unreasonable pollution. Due to nutrient pollution from AFOs, the federal government adopted more exacting mandatory CAFO requirements effective April 14, 2003. States have also been active in responding to perceived water pollution problems and complying with the federal mandates through new regulatory controls.

In devising suitable regulations for CAFOs, governments have considered costs and benefits that accompany the NPDES permitting programs. With the new federal CAFO regulations, the EPA attempted to offset the estimated $326 million in additional annual costs by similar annual benefits.[171] The EPA identified recreational benefits from improved water quality, reduced fish kills, improved shellfish harvests, curtailed eutrophication, lower water treatment costs, decreased livestock mortality, diminished pathogen contamination of sources of drinking water, abbreviated risks from antibiotics and hormones, improved soil properties, and reduced cost of commercial fertilizers for non-CAFO operations as benefits accompanying reductions of nutrient pollutants.[172] The EPA declined to regulate more AFOs in part because of the costs of compliance.[173]

Regulations governing potential nutrient pollution from AFOs have shown that voluntary measures can be important in addressing a problem so that fewer mandatory controls are necessary. Perhaps the lessons from nutrient pollution hold some opportunities for developing voluntary responses to some of the other issues that have generated public concern. Health effects, objectionable odors, use of antibiotics, animal welfare, and lost resources are contemporary issues related to AFOs that are causing some people to be uncomfortable with commercial animal production. The animal production industry may be able to address some of these unresolved issues through voluntary or industry-driven practices so that governments do not need to impose more mandatory proscriptions.[174]

With the integration of the poultry and pork industries, integrators are in a position to advocate the use of technologies, activities, and practices that address citizen concerns. For example, the poultry industry has already taken steps to cut back on the use of antibiotics.[175] Another idea that might be employed to sidestep further state regulations is to more effectively enforce existing CAFO regulations. By disciplining existing violators, there would be less pollution to serve as a justification for additional governmental controls.

Opportunities may exist for state health officials and government outreach programs to be more proactive in communicating information to producers. Through training sessions and other types of information, producers may learn how they can incorporate voluntary production practices that are environmentally friendly. Similarly, trade organizations may be able to broaden educational efforts to assist producers in eliminating practices that are offensive to significant numbers of the public. With

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171. EPA CAFO Regulations, *supra* note 3, at 7234.

172. *Id.* at 7234-7235.

173. *Id.* at 7190.

174. *U.S. Warned Against EU-Style Animal Welfare Rules in Consultancy Report*, AGRA EUROPE (Jan. 12, 1996), at N6 (advocating that producers voluntarily make their practices more animal-friendly); *see also* Terence J. Centner, *Evolving Policies to Regulate Pollution from Animal Feeding Operations*, 28 ENVTL. MGMT. 599, 606 (2001) (advocating wider adoption of BMPs).

175. Marian Burros, *Poultry Industry Quietly Cuts Back on Antibiotic Use*, N.Y. TIMES, Feb. 10, 2002, at § 1, p. 1.

voluntary efforts and industry-sponsored changes, producers may be able to assuage public concerns so that there are fewer issues requiring regulatory mandates.

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