

Executive Summary

Livestock and poultry manure can provide valuable organic material and nutrients for crop and pasture growth. However, nutrients contained in animal manure can degrade environmental quality if they enter the water. There is growing concern about the large amounts of manure nutrients being generated by large animal feeding operations and the potential for some of the nutrients to enter water resources and impair water quality.

Current manure management practices on the Nation's animal feeding operations are being evaluated in light of the changing structure of the livestock industry and the quantity, location, and sources of manure nutrients. This report—using data collected for the census of agriculture by the National Agricultural Statistics Service—estimates the number of confined animals, the amount of manure nutrients, and the capacity of nearby land to assimilate these nutrients. This analysis provides the basis for later assessment of the economic feasibility of land application as a manure management strategy.

The number of confined livestock farms declined by half from 1982 to 1997, while the number of confined animal units (AU) increased 10 percent. This increase has occurred due to more large farm units (with more than 1,000 AU), rather than large farm units becoming larger. The number of confined animal farms and the number of confined AU **declined** on farms with fewer than 300 AU from 1982 to 1997, and **increased** on farms with more than 300 AU.

Confined livestock and poultry produced over 1.2 million tons of recoverable nitrogen and 0.7 million ton of recoverable phosphorus in 1997. Most farms (78 percent for nitrogen and 69 percent for phosphorus) have adequate land on which it is physically feasible to apply the manure produced onfarm at agronomic rates. Still, manure produced on operations that cannot fully absorb it at agronomic rates accounts for over 60 percent of manure nitrogen and 70 percent of manure phosphorus. Manure nutrient production above potential onfarm assimilative capacity does not imply a water quality problem—it simply means that the manure would need to be transported from the producing farm to be effectively used in growing crops. Incentives may be needed to encourage producers to improve current manure management practices to ensure that applications are made at agronomic rates.

- ✿ Some farms in all size classes produce manure nutrients over the farm's potential assimilative capacity. However, the 2 percent of farms in the large size class (more than 1,000 AU) produced almost half of the excess manure nitrogen and more than half the excess manure phosphorus.
- ✿ The quantity of excess onfarm manure nutrients increased in all regions over 1982-97, with the greatest quantity increase in the Southern Seaboard region, and the greatest percentage increase in the Heartland.
- ✿ Most U.S. counties (about 75 percent) have at least one farm that needs to move manure off the farm to avoid excessive nutrient applications.
- ✿ Only about 5 percent of counties have farms that collectively produce manure nitrogen that accounts for over half the total nitrogen needs in the county. However, about 10 percent of counties produce manure phosphorus that exceeds half the county's total phosphorus needs.

As of early 2001, EPA proposals for future National Pollutant Discharge Elimination System (NPDES) permits for concentrated animal feeding operations (CAFOs) would require the development of nutrient management plans (NMP) as part of the permit. These permits would include management strategies for manure collection, storage, and disposal, including the land application of manure nutrients. We estimate that 5 percent of confined livestock farms are potential CAFOs under current regulations. These farms produced over half of the excess onfarm nitrogen and two-thirds of the excess onfarm phosphorus in 1997. If all potential CAFOs followed an NMP, the amount of nutrients available for runoff or leaching to water resources could be significantly reduced.

In areas with high concentrations of animals and high levels of excess onfarm nutrients, there may be insufficient land available for spreading at agronomic rates, particularly where NMPs are phosphorus based. Some producers will need to transport manure offsite, and incentives may be required to encourage local farmers without animals to use manure. Transportation costs will largely determine the economic feasibility of this strategy.

In any case, areas with insufficient land for spreading manure have the greatest need for alternatives to land application. Mechanisms to encourage industrial use of manure as a feedstock for commercial enterprises (fertilizer manufacturing or energy production) or central processing facilities would be especially valuable in these areas. These livestock clusters might also be strong candidates for targeting both policy-driven adjustments and USDA funding and research assistance.

All farms are eligible to apply for technical, educational, and financial assistance in managing manure nutrients under both USDA's Environmental Quality Incentives Program (EQIP) and the Conservation Technical Assistance Program. In addition, EQIP is authorized to assist small and medium-sized confined animal farms (less than 1,000 AU) with investment in storage and treatment facilities. Requests for subsidized manure storage and treatment facilities and nutrient management assistance will likely increase if NMPs are required on more farms.

Successful development of facilities to process manure at a central location may accelerate trends in animal industry concentration, while failure to find viable off-farm alternatives for manure may slow, or even reverse, these trends. Further research is needed to evaluate the impact of manure management policies on the animal industry.