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## Larger Farms, Environmental Policy Affecting Manure Management

Changes in the structure of livestock farms from smaller to larger increasingly specialized operations have altered manure management practices. Large-scale livestock operations are striving to develop ways to manage the problems associated with concentrating more livestock on confined animal feeding operations, including the problems posed by nutrient (nitrogen and phosphorus) management, and ammonia and methane emissions.

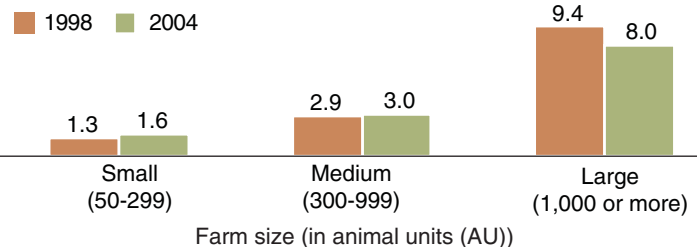
At the same time, changes to the Clean Water Act, State regulations, and local conflicts over odor are requiring livestock producers to more carefully consider their manure management decisions. In the hog industry, changing Federal and State environmental policies encouraged a shift in production from the Southeast to the Midwest during the late 1990s to mid-2000s. The regional shift in hog production was in part a response to State regulations in the Southeast focused on reducing the waste and odor associated with large manure lagoons and an increasing number of Federal and State policies aimed at reducing land applications of manure.

Data from USDA's 1998 and 2004 Agricultural Resource Management Survey of U.S. hog producers indicate how hog farm structure and manure management have been changing. The largest hog operations account for a larger share of total production—up from 34 percent in 1998 to 46 percent in 2004. At the same time, these large operations appear to have altered their manure management practices in anticipation of binding nutrient application constraints proposed under the Clean Water Act.

Between 1998 and 2004, large hog farms removed more manure from their operations, reduced the amount of commercial fertilizer they applied to crops receiving manure, and increased manure application to crops with higher nutrient needs. They also used more feed additives that reduce the phosphorus content of manure, tested more often for manure nutrient value, and increased their use of comprehensive nutrient management plans.

### Manure application intensity declined on the largest farms

Animal units per acre receiving manure



Note: AU is equivalent to 1,000 pounds of live animal weight.  
Source: USDA, Economic Research Service analysis of data from 1998 and 2004 ERS and USDA, National Agricultural Statistics Service, Agricultural Resource Management Survey.

The use of pit/tank manure storage systems increased, and the use of solid manure spreading declined in favor of incorporating liquid manure into the soil, thereby reducing the risk of nutrient runoff, air pollution, and odor. Hog feed efficiency also increased, reducing the amount of manure excreted per animal.

Manure nutrient application intensity generally increases with the size of a livestock operation as animals are concentrated on the farmland. However, the decline in application intensity among the largest hog operations between 1998 and 2004 suggests that environmental policy is contributing to the adoption of conservation-compatible manure management practices.  $\mathbb{W}$

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**This finding is drawn from . . .**

*Changes in Manure Management in the Hog Sector: 1998-2004*, by Nigel Key, William D. McBride, and Marc Ribaud, EIB-50, USDA, Economic Research Service, March 2009, available at: [www.ers.usda.gov/publications/eib50/](http://www.ers.usda.gov/publications/eib50/)