



# ERS *Report Summary*

Economic Research Service

March 2009

U.S. Department of Agriculture



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## Changes in Manure Management in the Hog Sector, 1998-2004

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Economic competition has driven rapid changes in the U.S. hog industry over the last 10 years. Production has shifted to larger operations that increasingly specialize in a single phase of hog production and are organized under production contracts. This expansion and consolidation means that fewer operations now manage an increasing volume of hog manure, magnifying environmental risks if it is mismanaged. Pollutants such as nutrients (nitrogen and phosphorus), ammonia, methane, and odor can originate from production houses where animals are kept, from manure storage structures such as tanks and lagoons, or from fields where manure is applied.

### *What Is the Issue?*

The changing structure of hog farms is altering manure management practices, as larger operations seek to manage nutrients on a limited cropland base. At the same time, strengthening of the Clean Water Act with regard to runoff from manure nutrients, State regulations like the 1997 moratorium on hog farm expansion enacted by North Carolina, and local conflicts over odor are requiring producers to alter their manure management practices. Information about the effects of recent policies and structural changes on manure management technologies and practices, the use of nutrient management plans, and manure application rates is useful for evaluating the effectiveness of environmental policies and determining future policy needs.

### *What Are the Major Findings?*

Over 1998-2004, the total number of U.S. hog operations fell by about 40 percent, and the average inventory grew from 2,589 to 4,646 head per farm. Data from hog producer surveys administered in 1998 and 2004 indicate that large hog producers (1,000 animal units or more) are altering their manure management practices to mitigate the environmental effects of increased concentration. In particular, the largest farms removed more manure from their operations (especially by giving it away for free) and applied less commercial fertilizer to crops receiving manure in 2004 than in 1998. Also, in accordance with EPA regulations, large hog operations conducted more nutrient testing of manure, increased the use of microbial phytase in feed (which reduces nutrients in manure), and increasingly followed comprehensive nutrient management plans.

Additional trends that suggest greater adherence to environmental regulations by the largest hog farms include: (1) a decline in the spreading of solid manure and liquid manure without physically injecting it into the soil (these two practices increase the risk of nutrient loss to the atmosphere and runoff); (2) a decline in the quantity of manure applied per acre; (3) a decline in the nutrients excreted per animal due to an increase in feed efficiency; and (4) an increase in the share of farms removing manure from their operation.

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The increasing concentration of hog production on large operations is expected to continue, meaning that manure management will continue to be an important issue to the hog industry and to others concerned with its environmental impact. Results of this research suggest that there still is significant room for reducing the environmental impact of manure through improved management. For example, hog operations, on average, apply manure to less than 30 percent of available crop acreage. Policy incentives, along with technological innovation, are likely to play an important role in the future of hog manure management and its environmental impact.

### ***How Was the Study Conducted?***

This study uses information from surveys of U.S. hog producers conducted in 1998 and 2004 as part of USDA's annual Agricultural Resource Management Survey (ARMS). The detailed surveys cover a cross-section of U.S. hog operations and collect information on production costs, business arrangements, production facilities and practices, and farm operator and financial characteristics. The surveys also provide information about manure storage and handling, fertilizer use, manure application techniques, Environmental Quality Incentives Program (EQIP) payments, the use of comprehensive nutrient management plans, and manure application rates. The data allow us to document the current state of manure management and track producers' responses to existing and anticipated manure-related regulations. Data from the surveys are analyzed by farm size according to the number of animal units (1,000 pounds of live animal weight) produced. Because larger hogs produce more manure, animal units provide a consistent measure for comparing farms that produce hogs at different stages of the production cycle.