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Trends and Developments in Hog Manure Management: 1998-2009

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What Is the Issue?

Over the last decade, U.S. hog industry production has shifted to fewer and larger operations that specialize in a single phase of hog production and the use of production contracts. Consolidation of operations has meant that an increasing volume of manure is often produced on farms with less cropland per animal for spreading the manure. A higher manure-to-cropland ratio has magnified the risk that manure nutrients (nitrogen, phosphorous, and potassium) and pathogens might flow into ground and surface water due to overapplication of manure on crops or leakage from manure storage facilities. These runoff contaminants can harm aquatic life and livestock and affect human drinking water. In addition, increased concentration of hogs per farm has led to conflicts with nearby residents or communities over odor and air quality. Legislative initiatives, such as the Clean Water Act and various State regulations, have implemented environmental policies to mitigate the risk of water pollution and reduce conflicts. Despite the pronounced shifts in hog industry structure and regulation, little information exists for assessing how these changes have affected manure management practices and environmental quality. Using data from three surveys of hog farmers, the authors shed light on these issues by examining how hog manure management practices vary with the scale of production and how practices have changed since 1998.

What Are the Study Findings?

- Hog farm operators altered their practices between 1998 and 2009 in ways that suggest intent to manage manure in a more environmentally sound manner. In 2009, operators were more likely to have comprehensive nutrient management plans and, accordingly, to have increased their efforts to apply manure at rates not exceeding the nutrient needs of the crop. They were more likely to have applied manure over a larger share of their cropland and to have increased their use of feed additives that reduce phosphorus in hog manure, increased the nutrient testing of manure, and removed excess manure from their premises. They were less likely to have added commercial fertilizer to crops receiving manure.
- Changes in manure management practices and outcomes from 1998 to 2009 are related to structural changes in hog production, particularly the increase in farm size and regional

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shifts of production. The changes include more use of pit/tanks and less of lagoons for manure storage; a decline in spreading solid manure, as well as in spreading liquid manure without incorporating it into the soil; and less intensive manure application by the largest farms.

- Environmental policies are likely behind some of the observed patterns of change in hog manure management between 1998 and 2009. For example, the relatively slow growth in production in the Southeast compared with the Heartland may be partly attributable to State regulations in North Carolina designed to reduce risks associated with manure lagoons. Nationally, greater use of comprehensive nutrient management plans, as well as a decline in intensity of manure applications by the largest operations, may be in response to Federal and State policies designed to reduce overapplication of manure nutrients. These changes suggest that larger hog operations are altering their manure management decisions in response to legal nutrient application constraints and that environmental policy is contributing to the adoption of conservation-compatible manure management practices.

How Was the Study Conducted?

This study uses information from surveys of U.S. hog producers conducted in 1998, 2004, and 2009 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 the authors to document the current state of manure management and track producers' manure management practices during a period of rapid change in the hog industry. Data from the surveys are disaggregated by farm size according to the number of animal units produced (by 1,000 pounds of live animal weight). Because larger hogs produce more manure, animal units provide a consistent measure for comparing manure handling trends among farms with different levels of manure output.