

Report for 2002DE3B: Graduate Fellowship in Water Quality: Environmental Policies For a Sustainable Poultry Industry in Sussex County, Delaware

- Water Resources Research Institute Reports:
 - Ward, Lynette, William Ritter, John Byrne, and Young-Doo Wang. 2001 and 2002, Environmental Policies For A Sustainable Poultry Industry In Sussex County, Delaware. Annual reports to the Delaware Water Resources Center, University of Delaware, Newark, Delaware, 30 and 5 pages, respectively.
- Dissertations:
 - Ward, Lynette. 2003. Environmental Policies For A Sustainable Poultry Industry In Sussex County, Delaware. Ph.D. Dissertation, University of Delaware, Newark, DE. 348 pages.

Report Follows:

Basic Information: Fellow Project #2 (of 3)

Title:	Environmental Policies For A Sustainable Poultry Industry In Sussex County, Delaware
NIWR Project Number:	2002DE3B
Start Date:	3/1/2000
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Focus Category:	Agriculture (AG), Economics (ECON), Policy (LIP), Non Point Pollution (NPP), Nutrients (NU), Water Quality (WQL)
Descriptors:	Agriculture, Economics, Policy, Non Point Pollution, Nutrients, Water Quality
Principal Investigators:	Lynette Ward, University of Delaware PhD candidate
Other Principal Investigators:	William Ritter william.ritter@udel.edu , Department of Bioresources Engineering; John Byrne jbyrne@udel.edu and Young-Do Wang youngdoo@udel.edu , Center for Energy and Environmental Policy, University of Delaware, advisors.
Project Class:	Research

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Publication

1. Ward, Lynette, William Ritter, John Byrne, and Young-Doo Wang. 2001 and 2002, Environmental Policies For A Sustainable Poultry Industry In Sussex County, Delaware. Annual reports to the Delaware Water Resources Center, University of Delaware, Newark, Delaware, 30 and 5 pages, respectively.
2. Ward, Lynette. 2003. Environmental Policies For A Sustainable Poultry Industry In Sussex County, Delaware. Ph.D. Dissertation, University of Delaware, Newark, DE. 348 pages.

The names and degree level (highest level during the reporting period) of all students who worked on the research project is: Lynette Ward, PhD recipient May 6, 2003.

A DWRC newsletter article on this project may be found at:
<http://ag.udel.edu/dwrc/newsletters/Spring2003p4.pdf>

Abstract (of PhD dissertation based on this fellowship's research)

Sussex County, Delaware produces more broilers than any other county in the United States, producing 232 million broilers in 1998. While poultry production is the primary economic activity in the county, it is also the primary source of nutrient pollution. Poultry litter is commonly applied directly to cropland in Sussex County as a fertilizer and is the primary litter disposal method. The poultry industry is highly concentrated within the county and there is not

sufficient cropland in the county on which to apply poultry litter at agronomic application rates. As a result, phosphorus levels have built up in the soils and nutrients now enter the county's waterways causing water quality problems. Although agriculture is the largest single land use within the county, urban land use grew by 22 percent between 1992 and 1997 and is expected to continue to rise as cropland gives way to development, further intensifying the problem of land application. Consequently, land application can no longer be the sole disposal method for poultry litter in Sussex County.

The intent of this dissertation is to develop environmental policies that promote the creation of a sustainable poultry industry in Sussex County, Delaware. Sustainable poultry industry practices meet the triumvirate goals of being environmentally sound; economically viable in both the short-term and long-term; and socially responsible in the sense of promoting equity, and preserving rural communities and quality of life. This research will identify and evaluate the economic feasibility of methods to reduce the phosphorus content of poultry litter or to find beneficial uses other than direct land application. The following alternatives are to be evaluated in terms of their economic feasibility and effectiveness. The methods designed to reduce the phosphorus content of poultry manure to be studied are: 1.) the use of low phytase corn in poultry rations, and 2.) the addition of the enzyme phytase in poultry rations. The alternative uses of poultry litter to be studied are: 1.) biogas production, 2.) energy generation, 3.) composting, 4.) use as a cattle feed supplement, and 5.) pelletizing.

The economic analysis of alternative uses of poultry litter would be conducted using IMPLAN, a PC based economic analysis software system that uses both data files and software to create regional models. Data files are available that include information for 528 different industries and 21 different economic variables. These datasets are available at the county level. IMPLAN will be used to do an economic analysis of not only the alternative uses for poultry litter, but to measure the economic and social impacts of developing a sustainable poultry industry in Sussex County in terms of factors such as dollars of sales, local taxes received, environmental regulatory compliance costs, impact on tourism revenues, and jobs created.

This research is of particular interest to the Delaware agricultural community whose incomes are heavily reliant on livestock. In 1998, the value of crops in Delaware was \$164 million, while livestock and products were valued at \$609 million. During this period, Delaware experienced economic growth while the nation as a whole experienced a decline in net farm incomes. This robust farm economy may not be enough to insulate Delaware's agricultural revenues from short-term economic losses related to the costs of complying with nutrient management regulations, which restrict the land application of livestock manure. Over the long-term these compliance costs may be passed on to the consumer, however in the short-term they pose a serious financial risk to small farmers.

While the scope of the study area is limited to Sussex County, the recommendations of this dissertation have the potential to create substantial changes in the profitability and structure of the livestock industry on the Delmarva Peninsula. This research will identify policies that reduce agricultural water pollution in a manner that is economically viable and protects the existing rural community structure and values.