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**IFSM-PREDICTED ENVIRONMENTAL AND ECONOMIC AFFECTS OF BMPS ON
REPRESENTATIVE FARMS IN SOUTHEASTERN PENNSYLVANIA**

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ABSTRACT: According to the U.S. EPA, agricultural runoff is the largest contributor to water quality degradation in the Chesapeake Bay, accounting for about 44 percent of nutrient pollution and 65 percent of sediment pollution that enters the Bay (Draft Chesapeake Bay TMDL, 2010). Pennsylvania produces the second most agricultural pollution of the six states within the Bay Basin. To combat agricultural pollution, farmers and conservation agencies around the country rely on best management practices (BMPs); however, BMP effectiveness may differ depending on method and location of application, the type of farm to which BMPs are applied, and the impact of weather.

The goal of this research was to investigate, through the use of the Integrated Farm System Model (IFSM), farm profitability and off-the-farm losses of nutrients and sediment by applying various BMP strategies on three "typical, representative" farms of the Lancaster, Lebanon, and Dauphin County region of Southeastern Pennsylvania. Typical farm scenarios were defined and characterized as an English dairy farm, a Plain Sect (Amish) dairy farm, and a crop farm. Current farm operations were simulated and used as a baseline for evaluating BMP impacts. Preliminary results show that current crop farm operations (reduced tillage) contribute up to 205% less sediment and up to 130% less phosphorus than mulch-till and conventional-till operations, while providing up to 18% greater farm profit. Further sediment runoff abatement and greater economic return is achievable for the current crop farm by switching entirely to no-till practices. Nitrogen leaching and denitrification is slightly impacted by change in tillage, with total variation less than 6% between the different tillages. Continuing research will apply additional BMPs (tillage management, alternative cropping scenarios, nutrient and manure management practices) to all three farm types to determine BMP impact on sediment and nutrient losses and farm profitability.

Modeling multiple farm categories using IFSM should provide results that may be referenced by regional officials making BMP recommendations on an environmental and economic basis. Comparing BMPs across multiple farm types should expose relationships between BMP suitability and farm type that are valuable to getting BMPs adopted, educating farmers and the public, and improving water quality.

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