

WATER QUALITY IMPACTS OF POULTRY MANURE HEADLAND STACKING

Paul T. Kivlin^{1/}, Dennis R. Frame^{2/}, and Fred Madison^{3/}

Abstract

Wisconsin is one of the nation's leading poultry producers. Manure generated by poultry has the potential to negatively impact the state's water resources if not properly managed. A common management practice associated with poultry manure handling is "headland stacking". Headland stacking involves temporarily storing poultry manure on field edges until the field is available for manure spreading (after the crop is harvested). As defined by a Wisconsin Department of Natural Resources (WDNR) WPDES permit for a poultry operation, headland stacking occurs when poultry manure is piled in fields for 11 to 365 days prior to spreading. In practice, most headland manure stacks remain in place fewer than 3 months.

In 2003, the UW-Discovery Farms Program began an investigation to determine whether the practice of poultry manure headland stacking posed a significant risk to surface or groundwater. Two studies were designed in cooperation with the WDNR, the United States Geological Survey, the University of Wisconsin's Geological and Natural History Survey, and the UW-Nutrient and Pest Management (NPM) Program.

The study examining the threat to surface water involved determining whether precipitation shed off the manure stacks had potential to carry pollutants from the stacking site. A 100 ton "typical" (100 feet long, 12 feet wide and 6 feet tall) headland manure stack was monitored over a period of 1 year to measure any water runoff. Over a 12-month period, no runoff events from the pile occurred. While this might not seem intuitive, some observations may help explain the lack of runoff. Poultry litter has an extremely high water holding capacity. Earlier laboratory work showed poultry litter held 37% of its weight in water. This ability to hold water meant the stack absorbed, and did not shed, the precipitation that fell. Additionally, heat created through the manure-composting process helped drive off moisture between rainfall events. The headland stack was, in effect, a large sponge and was able to maintain absorbency through the year. Based on the results of this study, poultry manure headland stacks pose minimal risk to surface water if they are sited away from areas of concentrated flow and severe slopes.

The study examining the threat to groundwater involved drilling monitoring wells around two "typical" headland poultry manure stacks to determine whether the stacks leached nutrients into groundwater. The two stacks were located on Rosholt silt loam soils with a groundwater depth of 12 feet (at the MM site) and 24 feet (at the RM site) and were in place for 1 year. The wells surrounding the stack sites were monitored for a period of 3 years (1 year with the stacks in place, 2 years following stack removal). The groundwater monitoring results from the two sites varied greatly and were probably most influenced by rainfall events. At the RM site, relatively

^{1/} Nutrient Management Specialist, UW-NPM Program, Ag Resource Center, Univ. of Wisconsin-River Falls, River Falls, WI 54022.

^{2/} Co-Director, UW Discovery Farms Program, P.O. Box 429, 40195 Winsand Drive, Pigeon Falls, WI 54760.

^{3/} Co-Director, UW Discovery Farms Program, WGNHS, 3817 Mineral Point Road, Madison, WI 53705.

relatively “normal” rainfall patterns existed over the three year monitoring period and no elevated nutrient levels were detected as a result of the poultry manure headland stack. At the MM site, a 10.5-inch rainfall event occurred within a 24-hour period while the manure stack was still at the site. Large portions of the stack became saturated and elevated nutrient levels in groundwater were later detected as a result. The design criteria for most conservation practices use the 25-year/24-hour storm event (4.66 inches) as an upper limit. The 10.5-inch storm far exceeded not only the 25-year design parameter, but also the 100-year storm event (5.8 inches). Under normal rainfall conditions, properly sited poultry manure headland stacks appear to pose minimal risk to groundwater.

Complete reports of both studies can be obtained from Judy Goplin, UW Discovery Farms, P.O. Box 429, 40195 Winsand Drive, Pigeon Falls, WI 54760 (jgoplin@wisc.edu) or the authors.