Cost effective manure management

April 5 2011

Recycling manure is an important practice, especially for large livestock producers. Manure can be used as fertilizer to aid in crop production, aiding livestock producers that grow their own feed crops. While manure does provide a rich nutrient source for crops, it also can contribute to nutrient leaching and runoff. This can contaminate the surrounding ecosystem and lead to eutrophication of waterways. The desire for farmers to be able to recycle manure in an environmentally safe manner while providing a sufficient supply of nutrients to their crops without reducing profit, is an ongoing struggle.

Scientists at USDA's Agricultural Research Service and Penn State used computer simulated farms with the support of field research to compare the environmental impact and economic efficacy of using alternative manure application methods in farming systems. The techniques and practices being evaluated included broadcast spreading with and without incorporation by tillage, band application with soil aeration, and shallow disk injection.

By comparing predicted ammonia emissions, nitrate leaching, and phosphorus runoff losses with those measured over four years of field trials, researchers were able to accurately evaluate the model and find a good agreement. By simulating techniques that would improve the incorporation of manure, the scientist noticed reductions in ammonia emission and phosphorus runoff.

The study showed that applying manure with a shallow disk injection device allowed the lowest nutrient loss without negatively impacting the

farm's profitability compared with the other techniques being studied. Band application of manure along with the use of soil aeration was less environmentally beneficial. Moreover the increased cost of production was usually greater than the overall economic benefit.

"Shallow injection of manure appears to be the best option for reducing nutrient losses to the environment. Although this additional equipment and the management required increase the cost of manure handling, the annual improvement in nutrient use can often offset this cost and in some cases may even improve farm profitability," said Al Rotz, one of the USDA-ARS scientists who conducted the study.

Results from the study were published in the March/April 2011 issue of the *Journal of Environmental Quality*.

Research is ongoing in Pennsylvania and other locations in the mid Atlantic area to further evaluate different methods for subsurface injection of manure in both liquid and solid forms. Refinement and adoption of this manure application technique is one of many potential strategies for reducing nutrient runoff into the Chesapeake Bay. Reduction in this nutrient loading is needed to help clean and improve the aquatic life in the Bay.

Provided by American Society of Agronomy