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Reducing Phosphorus Pollution of Surface Waters in Crop-Ethanol-Livestock Ecosystems of the Midwest

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Abstract:

The USDA-CSREES Managed Ecosystems and Nebraska Corn Board is funding a project to reduce P loading of surface waters associated with crop-ethanol-livestock ecosystems. It has five main objectives: 1) removal of P from the corn-ethanol stream to reduce dietary P for beef cattle; 2) develop a decision tool for feedlot manure handling options; 3) determine the effects of land application practices on manure P loss to surface waters; and 4) educate corn producers of P management issues. About 77 and 90% of the phytate P in beer bottom from dry-milling and in light steep water from wet milling was effectively degraded to phosphoric acid; experiments are underway for the removal of the degraded phytate P from the ethanol stream. Composting of feedlot manure was not found to be cost-effective relative to stockpiling for most feedlot situations unless the compost is a value-added product or if initial manure water content is >60%. The manure handling decision tool is under development. One-time deep plowing in cases of excessively high surface soil P reduced runoff volume and P concentration in runoff for substantial reduction in total P loss. Filter strips occupying 1% of the drainage area reduced runoff volume and runoff P loss by 54 and 68%, respectively. Farmed setbacks areas, ranging from 0 to 40 m in width, for non-application of manure near direct conduits to surface water were not effective in reducing runoff P load on terraced land. Education events for crop producers will be conducted during the winter months of 2008-9.

Impact Statement:

This interdisciplinary partnership of University faculty with the Nebraska Corn Board has generated valuable information to address P associated challenges in corn-ethanol-beef feeding eco-systems. Four papers are in advanced stages of preparation or have been submitted for publication in refereed journals reporting on: the characterization of P in ethanol production streams; nutrient and mass dynamics in feedlot manure handling systems; filter strip effects on P runoff; and setback effects on P runoff. The information will be dissemination in winter extension events in 2008-9.

Category: Agricultural BMPs

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