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Small Pasture-based Assessment of the Mississippi Phosphorus Index

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Abstract Text:

Many Mississippi broiler chicken farms use their broiler litter to fertilize pasture and forages for beef cattle production. Environmental operating permits for broiler farms in the state include nutrient management plans that require field specific risk assessments for off-target phosphorus movement developed using a Phosphorus Index adopted in 2000. Management factors, including broiler litter application rates and timing, are factors in the analysis. A field study investigated pasture management (haying, grazing, and combined haying and grazing), and broiler litter application rates (meet either crop N or P requirements) on nutrient runoff from common bermudagrass [*Cynodon dactylon* (L.) Pers.] pastures on Ruston fine sandy loam soil. Paddocks ranged from 0.10 to 0.70 ha. Runoff collected from 48 natural rainfall events from 2001 to 2003 was analyzed. Average runoff volume of grazed treatments was greater than hayed treatments regardless of litter application rate. Inorganic N content of runoff of the grazed paddocks when litter was applied at rates to meet crop N requirements was greater than when litter was applied to meet crop P requirements. Mean total P loss per runoff event ranged from 7 to 45 g ha⁻¹, with the greatest amount in the grazed treatment with litter applied on N basis. Total dissolved P was the dominant P fraction in the runoff ranging from 85% to 93% of the total P. Soluble reactive P was greater when litter was applied on N basis regardless of pasture management. Correlation of runoff data with predicted risk using the Mississippi Phosphorus Index will be presented.

Impact Statement:

These results show that P loss risk assessment in nutrient management planning is not an academic exercise, but rather a powerful tool fundamental in conservation planning. The project team provided input based on this work to the Mississippi NRCS as background for developing the new generation Nutrient Management Practice Standard 590. Additionally, the results are used in continuing education programs required for CAFO size broiler operation managers presented at four regional sessions and via two teleconferences, to date. Thus both land managers and their technical advisers protect the Mississippi water resource base using this information.