MEASURING WATER-EXTRACTABLE PHOSPHORUS IN MANURES TO PREDICT PHOSPHORUS CONCENTRATIONS IN RUNOFF

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Abstract

Water-extractable phosphorus (WEP) in manures can influence the risk of P losses in runoff when manures are land applied. There is some uncertainty about how WEP in manures should be determined. Specifically, are WEP measurements affected by manure sample handling before analysis, and what manure extraction procedures are most appropriate for predicting potential P runoff losses after manure application? We evaluated several manure handling and extraction variables in determinations of WEP in manures from a recent dairy diet P feeding study and in manures from several completed land application experiments. In each study, soluble P (DRP) concentrations in simulated rainfall runoff following surface application of the same manures were measured in field experiments. We related WEP determinations on manures to DRP concentration in runoff to evaluate WEP as a predictor of soluble P runoff losses following land application of manures. For manures from the dairy diet P study, sample pretreatments prior to extraction were fresh (no preparation), frozen and thawed, and dried and ground. Water extraction ratios ranged from 1:100 to 1:1000 with shaking times of one and two hours. Manure pretreatment, extraction ratio, and shaking time all had significant effects on WEP concentrations. WEP concentrations increased with extraction ratio and shaking time, but the 1:1000 ratio appeared to be less sensitive to manure sample pretreatment than other extraction methods. With the 1:1000 extraction ratio and one hour shaking time, WEP decreased in the order: frozen and thawed > fresh > dried and ground. WEP concentrations were significantly related to runoff DRP concentrations for all methods tested, but the 1:1000 ratio and one hour shaking time showed the best relationship. Manure WEP measurements have potential for predicting the risk of soluble P losses in runoff from land applied manures. Standardization of methods for manure sample handing and for measuring WEP are important for reliable interpretation of manure WEP data.

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