USDA-CSREES 2006 National Water Quality Conference

Water Extractable Elements in Raw, Heated and Granulated Poultry Litters

Water extractable phosphorus (WEP) can be used as an environmental indicator to assess the pool of readily soluble P in animal manures. We employed water extractions at various litter to deionized water ratios in raw, ground, heated, and granulated poultry litters to evaluate the effect of these litter treatments on WEP. Our results showed that granulation of poultry litter alone did not significantly affect the total elemental contents (Al, Ca, Fe, K, Mg, Zn) and that the lower contents of these elements in granulated litter than raw and ground litters were because of addition of urea, DCD, or hydrolyzed feathermeal during litter granulation. WEP was higher in the Whatman 40 than 0.45 µm filtered extracts and in the extracts that were analyzed with inductively couple plasma (ICP) than colorimetry. The overall affect of filtration and method of analysis could be greater in the intensive animal production areas where future application of P, if based on WEP, would result in reduced land application of poultry litter when calculated after Whatman 40 filtration followed by ICP analysis. This would, in turn, aggravate the manure surplus that needs off-farm solutions. Results showed that granulation of poultry litter resulted in transformation of P species from less soluble to more soluble that were extracted at lower extraction ratio (1:10). Conversely, the continuous increase in WEP in raw and ground litters with increase in litter water ratio from 1:10 to 1:250 suggests the dissolution of phosphate minerals. This was accompanied by parallel increases in the water extractable constituents (Al, Ca, Fe, K, Mg, Zn) and the highest correlation with Mg supports the observations on the dissolution of Mg phosphate minerals. Based on our litter water extractions, we suggest that results of WEP in animal manures should be carefully evaluated before devising best management strategies for manure use.

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