Reducing Particulate and Dissolved Phosphorus in Dairy Manure Suspensions. (S11-dao170030-Poster)

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Abstract:

In confined animal feeding operations, inefficiency of mechanical liquid-solid separators has led to frequent losses of waste storage capacity. Water treatment polymers and P immobilizing chemicals were used to determine dissolved reactive P (DRP) reduction mechanisms in high total suspended solid (TSS) dairy manure. Co-application exceeded aggregation levels achieved with individual amendments. At marginally effective polymer rates between 0.01 and 0.25g/L, maximal aggregation was attained in combination with Al2(SO4)3 (3 and 30 mM Al3+), FeCl3 (3.7 and 37 mM Fe3+), and coal-combustion ash in 30 (TSS30) and 100g/L (TSS100) suspensions, respectively. The ash destabilized manure suspensions at rates exceeding 50g/L as ash particles acted as an in situ screen. Also, the ash reduced DRP at rates exceeding 1g/L. Surface functional groups such as -SiOH and -MOH reacted with H2PO42- to reduce DRP. Iron and Al salts also lowered DRP at rates less than 37 mM but higher rates re-dispersed particulates and increased DRP due to increased acidity and EC. Thus, the synergism of flocculant types allows chemical input reduction while enhancing particulate and dissolved P separation and removal in high TSS liquid manure.

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