Effect of acidification on solid–liquid separation of pig slurry

Manure management causes massive nutrient losses to the environment. Acidification can reduce ammonia emissions and solid–liquid separation improves organic nutrient distribution on fields. Because acidification changes slurry composition, it impacts on the subsequent operation of solid–liquid separators and products. The aim was to determine the effects of slurry acidification on separation processes: screw pressing, centrifugal decanting, and flocculation with drainage. Separators were operated at full scale, and the electrochemical, physical and chemical properties of raw slurries, solid fractions and liquid fractions were analysed. Acidification of slurry increased the flow rate in the screw press due to presence of larger particles; in the decanting centrifuge due to lower slurry viscosity; and for flocculation with drainage due to reduction in the electrical charges on slurry particles. The rapidity with which acidified slurry was separated increased the loss of slurry constituents to the liquid fraction, including particulate matter; e.g. was the dry matter content in the solid fraction 10–50% lower upon acidification. In the solid fraction, acidification reduced the amount and concentration of particulate species, increased the amount and concentration of divalent species, and decreased the amount of monovalent species but it did not affect their concentration. Overall, acidification simplified the operation of separators and increased the flow rate of the operation. Solid fraction volume, P:N ratio, fertilisation value and energy value all decreased, but increased in the liquid fraction. Thus management and environmental benefits can be realised from the combined acidification and subsequent separation of pig slurry.

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