lying 60 cm, and the suspended solids concentration of the residuals then can be reckoned using the lower sedimentation tank volume in which the residuals are contained. Fig. 3 shows the results based on sedimentation data in the writers' Fig. 2. It is seen that in the range of 1–2% dilution advocated by the writers, the final sludge concentration is much lower than the initial undiluted concentration. Hence, the objective of removing water from the swine waste so as to facilitate transport would not be achieved, and still more expenditure would be required to reconcentrate the residues back to their initial 6% value.

Sedimentation performance data over a range of dilutions were not presented for swine waste treated with alum or ferric chloride. However, examination of the data from tests in which swine waste was diluted to 1% suspended solids and dosed with 1500 mg/L of alum or ferric chloride indicates that the same general conclusions from the sedimentation tests without chemicals (Figs. 2 and 3) would be reached. Swine waste diluted to 1% suspended solids, treated with 1500 mg/L ferric chloride, and settled yielded sludge containing 2.8% suspended solids. With alum treatment, the final sludge suspended solids concentration was 3.2% (for comparison, the settled sludge concentration was 2.5% when swine waste was diluted to 1% and settled without chemical addition, and the initial, undiluted, waste suspended solids concentration was 6%). In calculations involving suspended solids in chemically treated waste, I ignored the mass of suspended chemical reaction products as, apparently, did the writers.

In summary, dilution before treatment of the swine waste considered by the writers is not advisable.

Closure to "Effects of Solid Levels and Chemical Additives on Removal of Solids and Phosphorus in Swine Manure" by Pius M. Ndegwa, Jun Zhu, and Ancheng Luo

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The writers believe that the discusser missed the crux of objective (i), which sought to investigate the effect of different solid levels on natural sedimentation of swine manure. The main thrust of this objective was to identify the settling characteristics of swine manures commonly encountered in the swine industry today. In the opening paragraph of our paper, an effort was made to show the range of solid levels that is likely to be found in swine manure in the widely used collection system, i.e., the slurry system. Previous research (Voermans and de Kleijn 1990; Powers et al. 1995) concluded that in the slurry systems even where farmers were very conservative with the use of water, slurry with solid levels of higher than 5% are not common. Other studies (Hart et al. 1966) have looked at the ease of handling versus excessive volume and a range of 1–4% total solid (TS) levels has been recommended as a compromise between ease of handling versus excessive volume when working with swine manure. It is based on this information and the authors experiences (P. M. Ndegwa and J. Zhu, unpublished, 2001) that TS levels of 0.5–6% were taken as representative of swine manure collected using these slurry systems.

Although in the "Methods and Materials" section, the manure was diluted to obtain manures with different TS levels, this was done to merely adjust the TS to levels commonly found in the swine industry today. A careful examination of the "Results and Discussion" and "Summary and Conclusions" sections will reveal that the writers have and did not recommend dilution of swine manure as a method of achieving better settling characteristics. The writers agree with discusser only to the extent that the first paragraph in the "Summary and Conclusions" section: "Solids above 2.0% or below 1.0% levels were found to affect natural sedimentation negatively. Solid levels between 1.0 and 2.0% in the swine manure were found to be suitable for effective natural sedimentation of swine manure stored in a sedimentation tank," may be a little confusing when taken out of context. The take-home message here should be: within the range of TS (0.5–6%) commonly found in the swine manure industry today, only manures that fall within 1.0 and 2.0% can effectively be settled by natural sedimentation.

With the information provided in this study, the individual has the discretion to adjust the TS in their manures to fall within this range and then deal with the added volume of the liquid. However, the points the discusser raised in his discussion in regard to this study are indeed valid but only to the extent that, dilution of swine manure is under consideration to enhance natural sedimentation. A treatment process that intends to use swine manure dilution to enhance natural sedimentation should consider all the issues raised in the discussion before making a decision on whether to dilute or not.

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