

Dairy Manure Additives

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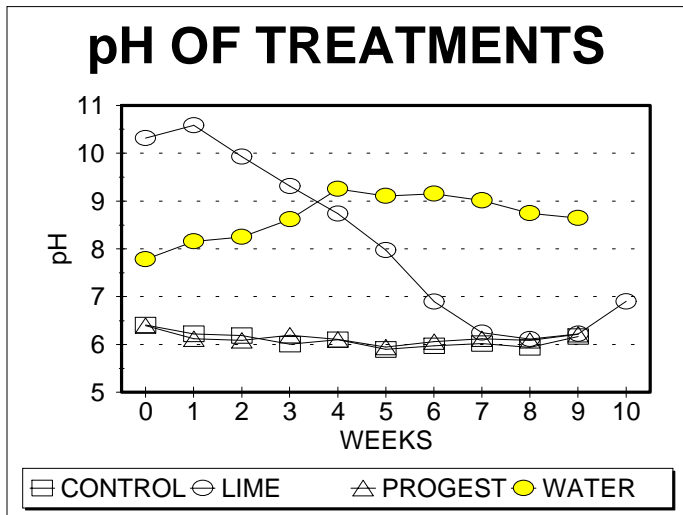
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Manure management has become an increasingly complex issue for dairy farmers, causing many to alter their manure handling techniques. Odor emissions from livestock facilities are of prime importance, with over 60 volatile compounds having been identified in gases emitted from animal wastes.

Many farmers store manure in lagoons or slurry pits. While this is an efficient way to handle manure, emptying these storages results in more manure being spread over a short period of time. Also, these storages rely on bacterial decomposition to liquefy particles, and this process is a primary source of odor. One possible way to reduce objectionable odors is through the use of additives which alter the chemical content of manure.

In summer 1995, in cooperation with Peter Wright at Cornell University, we evaluated the effects of Progest, a commercial manure inoculant, and hydrated lime which is a byproduct of acetylene production. We filled 75-gallon stock tanks with a 1:1 manure-water slurry. Three tanks were treated with Progest, three with hydrated lime, three with untreated slurry, and one with water to measure precipitation/evaporation. Temperatures and pH were measured weekly. Manure in each tank was analyzed for nutrient content at the beginning of the research trial, and for nutrients and sulfur compounds after agitation at the conclusion nine weeks later.

The idea behind using hydrated lime is to increase manure pH to over 10, thus halting biological activity. However, it took lots more lime to increase the pH than expected; based on our results it would take 4# of hydrated lime per cow per day to raise the pH of slurry manure to 10. Even so, the pH soon began a steady decline, and by week 9 was about the same as the other treatments. A small-scale trial at Cornell found essentially the same trend. Samples from the lime-treated tanks taken after mixing on week nine are recorded at week 10, and show an increase over pre-agitation samples, suggesting that there was some settling out of the hydrated lime.



There was a decline in both organic N and ammonia for all treatments. Losses were greater in the lime-treated manure, but because the lime-treated manure had a higher initial N concentration (we have no idea why, analysis found no N in the lime), final N concentration was the same for all treatments.

A “Snifforama” (no relation to Charlie Sniffen) investigated any correlation between manure treatment and perceived odors. Twenty-three lucky Miner Institute employees who in a pretest had been determined to have the ability to discern differences in manure odors evaluated two manure samples which were identical and one which was different. This was done for each treatment. Here are the results:

<u>Percentage of participants correctly identifying the unique sample</u>		
<u>Control vs. Progest</u>	<u>Lime vs. Control</u>	<u>Progest vs. Lime</u>
40%	65%	71%

Had there been no difference between samples, in each case half of the panelists would have chosen each sample, and the above percentages would have been about 50%. Most panelists said that lime-treated manure had a more offensive smell, and that it had a stronger ammonia smell. There were no conclusive differences odor evaluation between Progest-treated manure and the control.

Samples were analyzed by Cornell University for five sulfur compounds associated with objectionable odors. There were no significant differences in methane or sulfur compounds between Progest and untreated manure. Lime-treated manure, however, had virtually no methane but greatly increased levels of methyl mercaptan, dimethyl sulfide, and dimethyl disulfide. These results are consistent with the odor analysis which found the lime-treated manure to be more offensive.

In summary, we found no differences in nutrient retention between any treatments, and no differences in odor emissions between untreated and Progest-treated manure. Lime-treated manure had a stronger ammonia odor, but this may be because pH decreased with time. The lime-treated manure also had more sulfur emissions at the time of testing. This could be due to the delay in decomposition that occurred as the pH at first prevented microbial action and then declined over time.