

ONA REPORTS

published in

THE FLORIDA CATTLEMAN AND LIVESTOCK JOURNAL

June 2004

Lime-Stabilized Sludge and Soil pH

Dr. Martin Adjei

*University of Florida/IFAS
Range Cattle Research and Education Center*



For questions or comments regarding this publication contact

[Dr. Martin Adjei](#)

In theory, acidity refers to the concentration of active (A) hydrogen ions (H⁺) in a system. It is measured by an index called pH. The lower the pH, the more active hydrogen ions are present and the more acid the system. A pH of 7 (as is the case for distilled water) is neutral (H⁺ = OH⁻), and for soil a pH of 7 is too high for most forages in Florida. A pH of 5 to 6 is slightly acidic and satisfactory for most Florida forages to grow. A pH of 4 is too low or very acid and will result in poor root growth or function of most Florida forages.

Soil acidity tends to increase with repeated use of nitrogen fertilizer, and liming with calcium or calcium/magnesium compounds capable of reducing soil acidity becomes necessary. For example, it requires 60 lb of lime to neutralize the acidity resulting from the application of 100 lb ammonium nitrate and 110 lb of lime to neutralize the acidity from 100 lb of ammonium sulfate. Increased soil acidity (pH < 5) could reduce pasture production by more than a third, regardless of N fertilization, and predispose the grass to damage by soil-borne insects and grass yellowing. On the other hand, indiscriminate use of lime on coarse-textured soils could lead to excessive alkaline conditions and deficiencies of iron, manganese and other micro nutrients. Adequate liming recommendations are based on a knowledge of the soil pH and buffer capacity which only the soil laboratory can provide.

In recent years, many livestock producers applied lime-stabilized sludge to pastures to reduce the cost of fertilizer and lime. Although lime is added in the processing of sludge to reduce pathogens, insect vectors, and odor, limed sludge is an excellent source of slow-release plant nutrients (especially N and P), organic matter, and lime. During application, the pH of limed sludge could range anywhere between 7 and 11 with the

range of N and P content of the dry material in the neighborhood of 3 to 5%, and 2 to 4%, respectively. Four years of repeated application of limed-sludge at the Range Cattle REC has shown that when used at recommended agronomic rates, bahiagrass forage production responds wonderfully to sludge organic fertilizer.

Like all good things, too much can cause serious problems to the condition of pastures. Bahiagrass roots cannot function properly to absorb sufficient iron, manganese and other micro nutrients when the soil pH approaches 7. Several bahiagrass pastures in Polk, Pasco and Hardee counties where excessive amounts of sludge were applied repeatedly attained a soil pH of about 7 and have lost substantial portions of the grass stand to weeds. It is easy to identify the strips on those pastures where sludge was applied excessively.

As a precaution for using limed sludge, monitor soil pH every 2-3 years and alternate sludge use with inorganic fertilizer such as ammonium sulfate or ammonium nitrate. In extreme situations, it may be necessary to apply elemental sulfur to recover sludge-damaged pastures. In a pasture used for hay production in Polk county, we observed a pH decrease from 6.8 to 6.6 over one year when sludge application ceased and ammonium sulfate (100 lb N/A) was used. We are beginning work with sulfur application to reduce soil pH and will have specific recommendations in the near future. ast.