



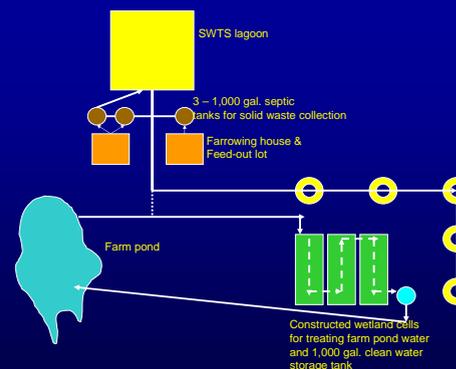
# University of Arkansas at Pine Bluff (UAPB) Demonstration Farm, Swine Waste Treatment System and Constructed Wetland

## Introduction:

The United States (U.S.) has approximately 330 million acres of agricultural land that produce nutritious food and other products. Approximately one billion tons of manure are produced each year by livestock. Surface water quality and odor associated with swine waste management is a key concern for most small farmers. The facility operation and agriculture activities are considered major contributors to water pollution. Some of the agricultural activities include farming activities such as animal confinement facilities, grazing, irrigation, land application, sedimentation, pesticides, and wastewater runoff, etc. Swine production has become one of the most important U.S. agricultural industries in recent years. Large amounts of swine waste cause environmental concerns such as greenhouse gases, odor emissions, and potential nutrient contamination to surface and ground waters. Currently, the anaerobic lagoon is the most widely used technology for swine waste treatment in the southwestern region of the U.S. This research will evaluate the water quality and odors associated with a swine waste treatment lagoon system on the UAPB demonstration farm. In addition, this research will investigate the effectiveness of wetland cells with various wetlands for farm pond water quality improvement.

## Objectives and Methods

1. Evaluate the long-term effectiveness of a swine waste treatment lagoon for treating swine waste from a confined swine holding area.
  - The long-term effectiveness of a swine waste treatment lagoon will be assessed by monitoring the water quality of the lagoon on a weekly basis during the spring and summer months (April-July)
  - Soil samples will be taken from the effluent sprinkler field area before and during effluent application
  - Fecal coliform in the samples will be analyzed with the MFC agar method
2. Evaluate the effectiveness of a constructed wetland for treatment of hill-slope runoff from a small farm watershed
  - Objective two will be accomplished by taking water samples from the UAPB farm pond, the water entry point of the created wetland (CWL), and the discharge of the CWL
  - Hach test-in-tube total nitrogen and total phosphorus tests will be used in conjunction with a Hach DR4000 spectrophotometer to analyze nitrogen and phosphorus water samples
  - The constructed wetland vegetation will be rotated on a three year basis with vegetation harvest after the third year
  - Constructed wetland vegetation may include *Canna spp.* (Canna Lillies), *Typha spp.* (Cumbungi) and *Polygonum amphibium* (water smartweed).
3. Evaluate the odor associated with a swine waste treatment lagoon
  - The olfactometry method will be used to measure odor concentration in lagoon air both before and after establishment of odor mitigating vegetation
4. Model hill-runoff from a small farm watershed using the Agricultural Policy Extender (APEX) model
  - This objective involves the use of the APEX model to predict hill-slope runoff from the UAPB farm. The modeler will take into account the livestock, cover type, soils, and cropping systems that make up the UAPB Farm study area.



The swine waste treatment system (SWTS) lagoon will be used to treat liquid swine waste. Liquid waste from the lagoon will be applied to pasture.

Three 1,000 gallon septic tanks will be used to collect solid swine waste.

The constructed wetland will be used to improve farm pond water. Farm pond water is the source of drinking water for farm animals.



Lagoon site under construction



Canna Lillies being cultured for the constructed wetland

Completed Constructed Wetland

For Additional Information: Alicia R. Farmer, M.S., Agriculture Department  
University of Arkansas – Pine Bluff, farmer\_a@uapb.edu

Ed Buckner, Ph.D., Agriculture Department,  
University of Arkansas – Pine Bluff, buckner\_e@uapb.edu