



# Phosphorus Monitoring of Swine Effluent on Pasture

G. Alexander and M



## INTRODUCTION

Swine producers in Arkansas are required to obtain nutrient management plans under the authority of State Regulation 5. Almost all commercial swine operations in Arkansas are considered an AFO/CAFO and will have to Obtain federal permits issued by the State that makes provisions for land application. One provision will be for swine operations to obtain and implement Comprehensive nutrient management plans (CMNP). CMNP's require that manure application rates are to be made on a phosphorus basis rather than on a nitrogen basis. The State of Arkansas has adopted the Arkansas P-Index for pastures as the tool for determining P-based application rates. Recently, the Arkansas P-Index has been modified to properly account for liquid applications of manure.



Since many swine producers in Arkansas are unaware of these new requirements and changes in nutrient management planning, we have initiated a CNMP and P-Index demonstration for swine farms. The purpose of the demonstration is to develop "real farm" database that can be used to educate swine farmers about the changes in nutrient management planning.

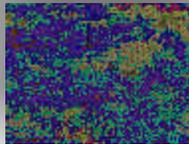
One specific objective is monitor changes in soil test phosphorus (STP) over time to determine how quickly STP levels in his application fields increased.

## DEMONSTRATION SITE

The farm started its swine operation in 1996 with 500 sows. The swine manure from the lagoon is fed to risers in a 70 acre field through underground pipes. The manure is applied 3 times a year, with the amount applied dependent upon an assay of the liquid manure. Typically, 12,000 gallons per hour are pumped from each riser that covers about 2 acres.



Portion of the Phosphorus Index demonstration field with a swine production unit in background



A riser from which liquid swine manure is applied to the field.



Application of liquid swine manure onto Phosphorus Index demonstration field.

## APPROACH

The application field was mapped by GPS and a random test site was selected. Twenty sample locations within the test site were established using GPS coordinates. Soil samples were taken from the sample locations and analyzed for phosphorus content. Samples will be taken every six months at the same locations.

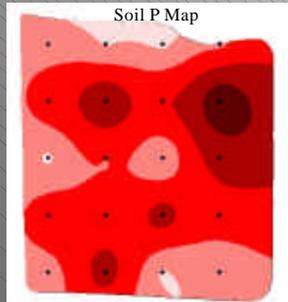


## RESULTS

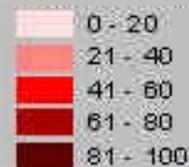
Soil Test Analyses for pH, Phosphorus and Potassium (Lbs./Acre)

Plot	pH	P	K	Plot	pH	P	K
0	5.4	29	273	10	4.9	19	307
1	5.3	70	403	11	5.0	68	416
2	5.4	17	227	12	5.1	54	348
3	5.1	26	517	13	5.7	82	272
4	5.4	56	535	14	4.7	60	394
5	5.3	47	424	15	5.4	99	561
6	5.3	71	330	16	5.1	28	373
7	5.3	50	495	17	4.9	18	405
8	5.0	16	324	18	4.6	15	354
9	5.3	40	424	19	6.3	35	622

Soil P Map



Soil P Levels  
lbs./A



## THE FUTURE

The next step will be to apply the Arkansas P-Index for pastures to this field and develop "what-if scenarios".

This nutrient management tool was developed as a risk assessment tool for estimating phosphorus runoff potential from individual fields. The Index for pastures takes into account 8 site characteristics grouped into P Source and P Transport categories and Annual Precipitation. Best management Practices are also considered because they help reduce inputs into an aquatic environment. The weighted P-Index matrix is stated as:

$$P \text{ Index} = \text{Source} * \text{Transport} * \text{Precipitation} * \text{BMP}$$

## Arkansas P Index "What if" Calculator

This computer program is being used by County Agents to educate producers on nutrient management planning. Green cells represent cells containing inputs that can be changed. Clicking on the green cells will produce a pop down menu of possible inputs. Ask for a demonstration.

