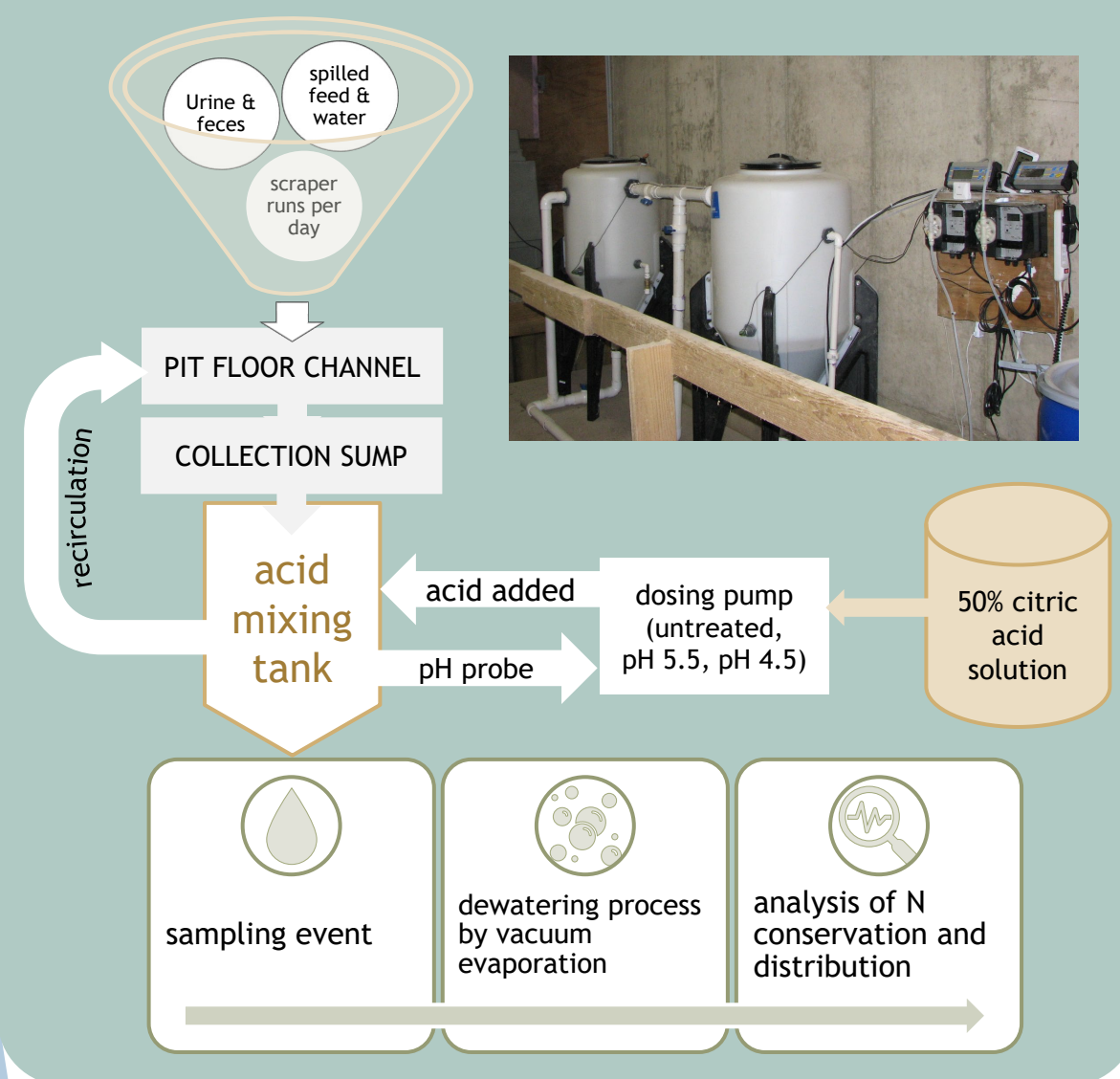


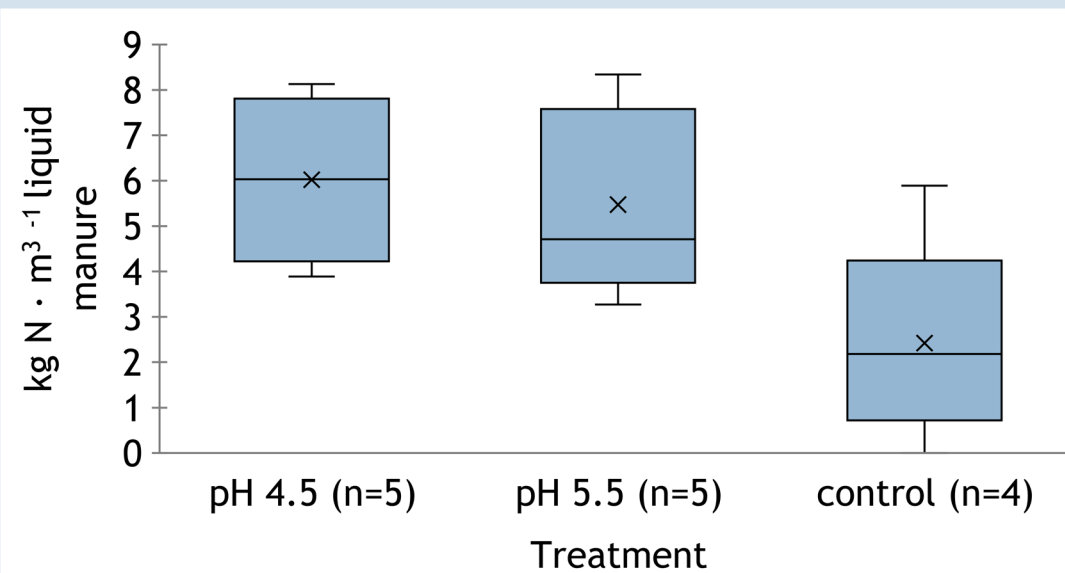
Liquid Swine Manure Nitrogen Conservation and Concentration Technology

GOAL: This is an ongoing project to develop a sustainable manure management strategy that conserves ammonia nitrogen and provides recycle water and a concentrated organic fertilizer to swine farms.

PILOT SYSTEM: An inhouse acidification system was installed to treat swine waste from one half of a 1,200 head finishing barn with a separating scraper to apply a 50% citric acid solution to a pH of 5.5 or pH 4.5 in the liquid waste stream in the collection channel. Acidified liquid was recirculated into the collection channel to reduce nitrogen loss prior to reaching the dosing tank.



Nitrogen Conservation in Recirculating System:

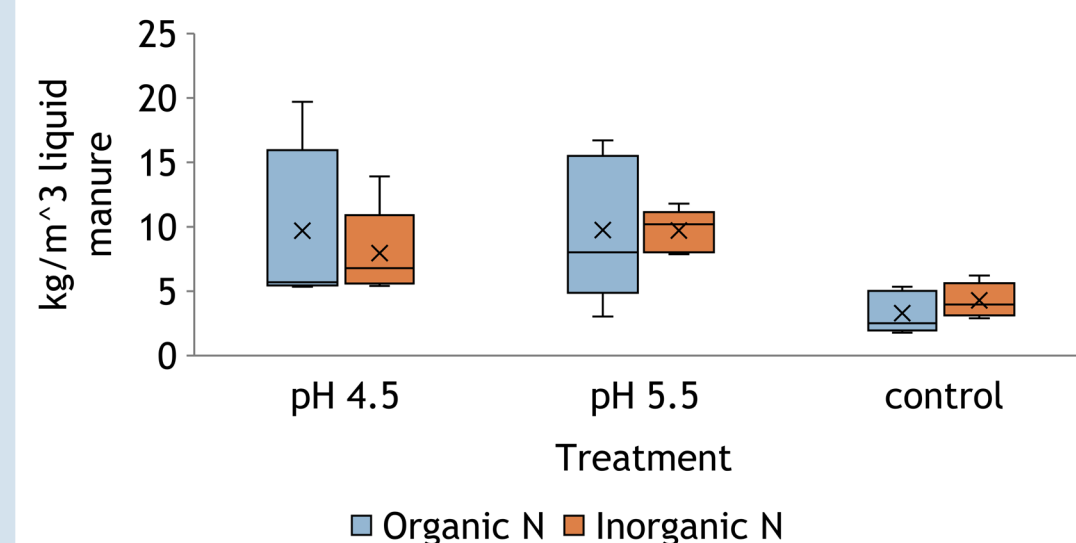


- mean nitrogen concentration 2x higher in acidified samples
- mean of the two pH treatments not statistically different ($p = 0.69$, $\alpha = 0.05$)

citric acid:

- a weak organic acid
- safer treatment alternative to strong acids (e.g., sulfuric acid)
- ~ 2x acid required to reduce liquid manure from pH 7.0 to pH 4.5 than to pH 5.5

Nitrogen Concentration after Processing:



- nitrogen concentration in the treated concentrate recovered from the boiling flask of the rotary evaporator is significantly higher than untreated concentrate
- percent water removed was 76 ± 3.8 , 73 ± 3.1 , and 79 ± 2.7 , for pH 4.5, pH 5.5, and untreated, respectively (n=5).

VACUUM EVAPORATION PARAMETERS: 5L rotary evaporator · 50°C water bath · vacuum pressure range: 1.5 ± 0.21 kPa abs (acidified samples) and 5.4 ± 1.5 kPa abs (unacidified samples) due in part, to excessive foaming.

Future Work:

- On farm study of low temperature vacuum evaporation
- Application to other swine manure feedstocks (e.g., digestate)
- Economic and life cycle analysis of proposed technology



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