

# Nutrient Concentrations of Runoff During the Year Following Manure Application

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# Objective

- Determine whether tillage and time following the application of beef cattle or swine manure to a corn crop affected runoff nutrient transport.

# Experimental Procedures

- The investigation was conducted near Lincoln, Nebraska from June 2002 to May 2003
- A silty clay loam soil was located at the study site
- Plots were 0.75 m wide by 2 m long

# Experimental Procedures

- Three 30- min rainfall simulation runs were conducted
- The simulated rainfall events were separated by 24- hr intervals
- The design rainfall intensity was  $70 \text{ mm hr}^{-1}$





# Experimental Variables

- Manure Type
- Tillage
- Time Following Manure Application

# Manure Type

- Beef Cattle
- Swine







# Manure Application Rate

- Manure was applied at rates required to meet established annual nitrogen requirements for corn (151 kg N ha<sup>-1</sup>)

# Tillage

- No- Till
- Till





# Time Following Manure Application

- 4 days
- 32 days
- 62 days
- 123 days
- 354 days







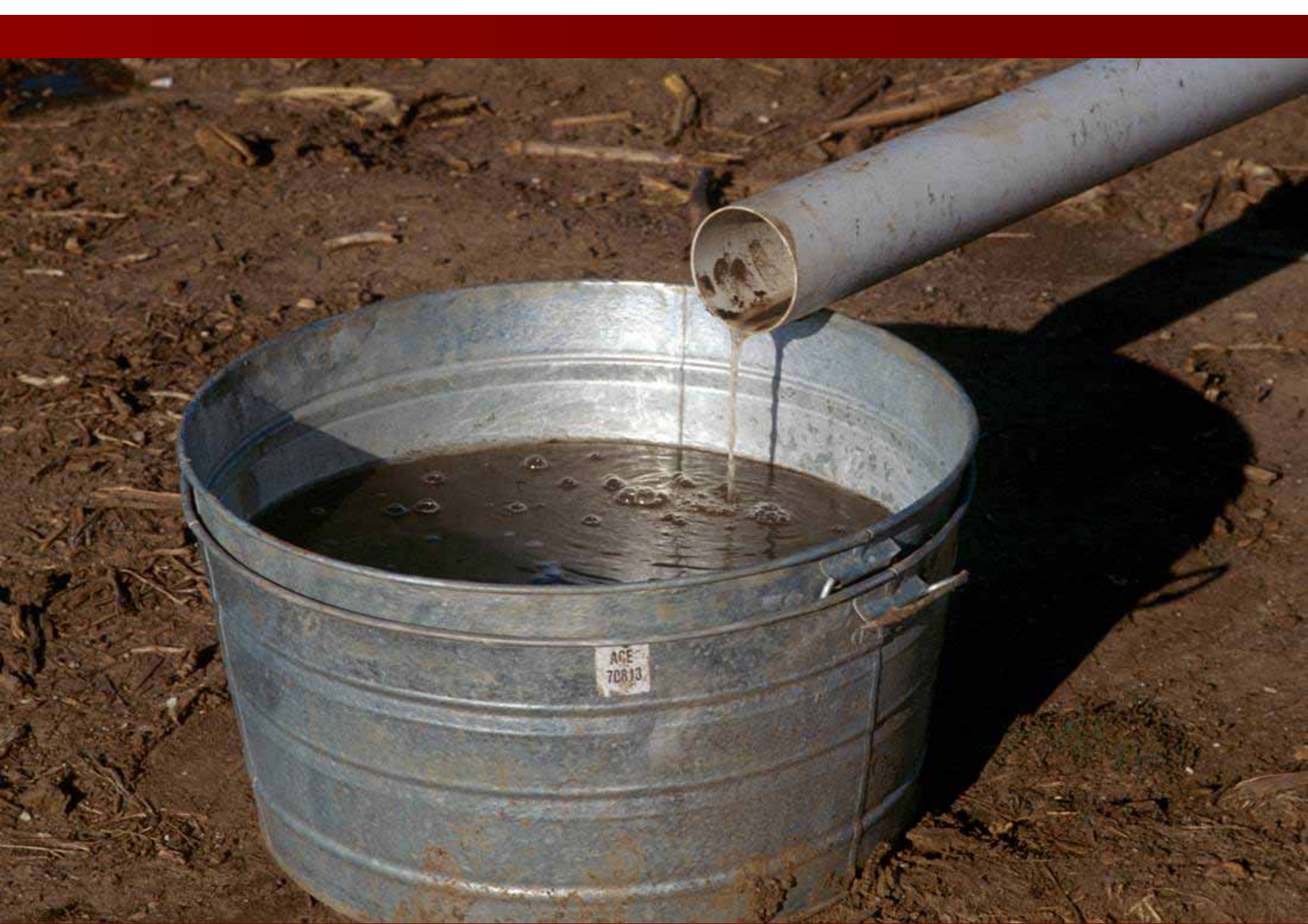


# Replications

- During each testing interval, experimental treatments were replicated 3 times
- A total of 60 plots were examined during the study

# Nutrient Constituents

- Dissolved Phosphorous (DP)
- Particulate Phosphorous (PP)
- Total Phosphorous (TP)
- $\text{NO}_3\text{-N}$
- $\text{NH}_4\text{-N}$
- Total Nitrogen (TN)







# Statistical Analyses

- ANOVA was performed to identify the effects of tillage and time since manure application on water quality characteristics
- The LSD test was used to determine statistical significance among treatment means

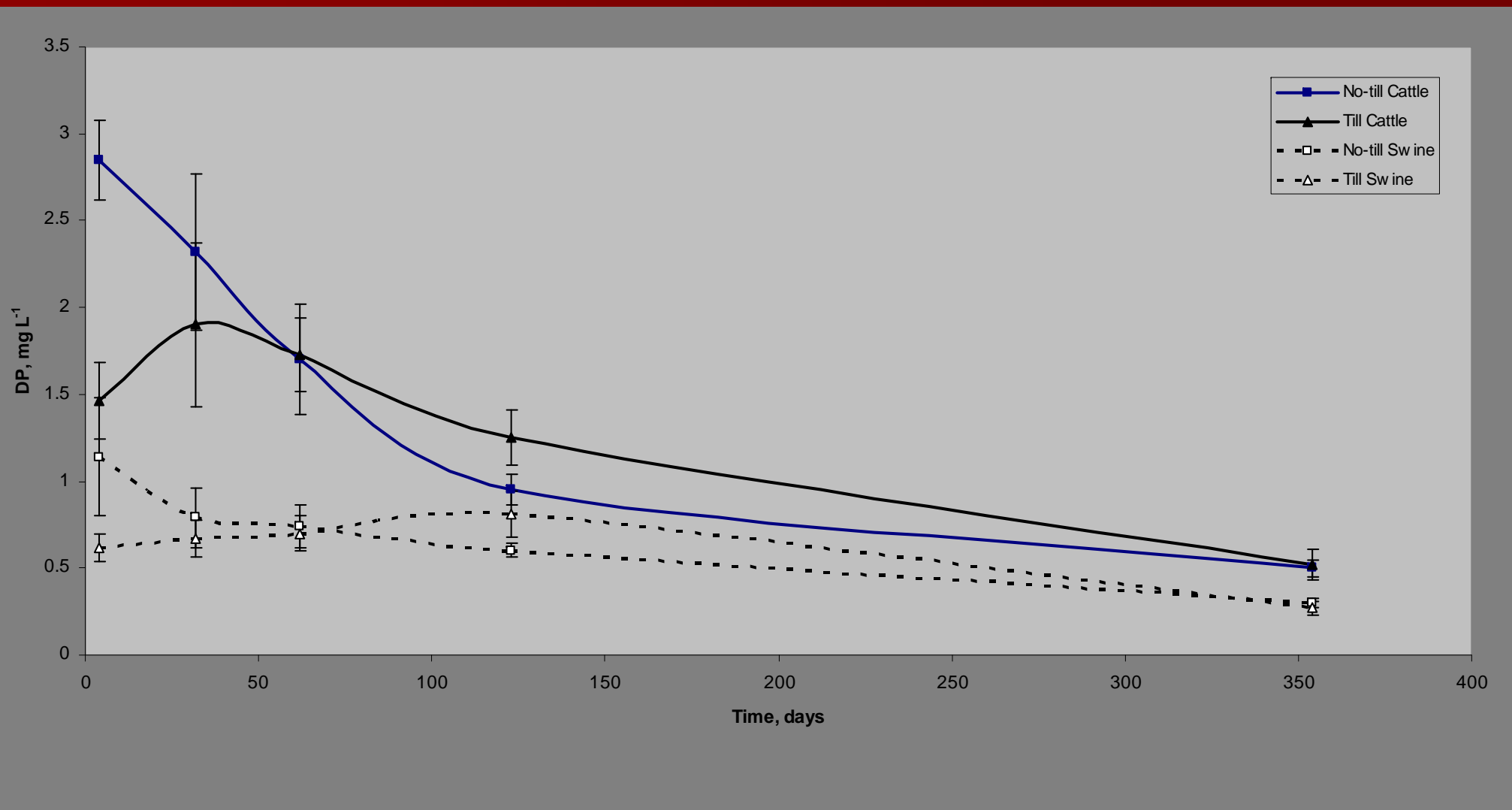


Figure 2a. Dissolved phosphorus (DP) concentrations of runoff versus time since manure application for the experimental treatments.

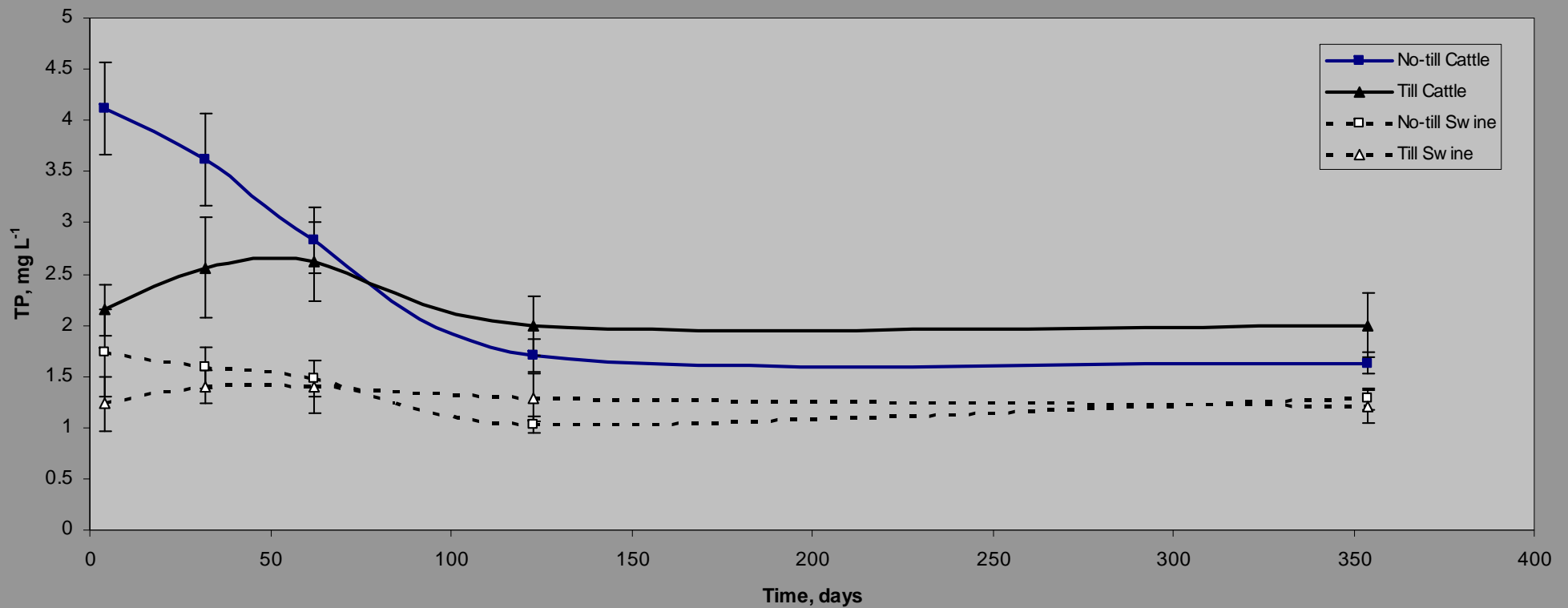


Figure 2c. Total phosphorus (TP) concentrations of runoff versus time since manure application for the experimental treatments.

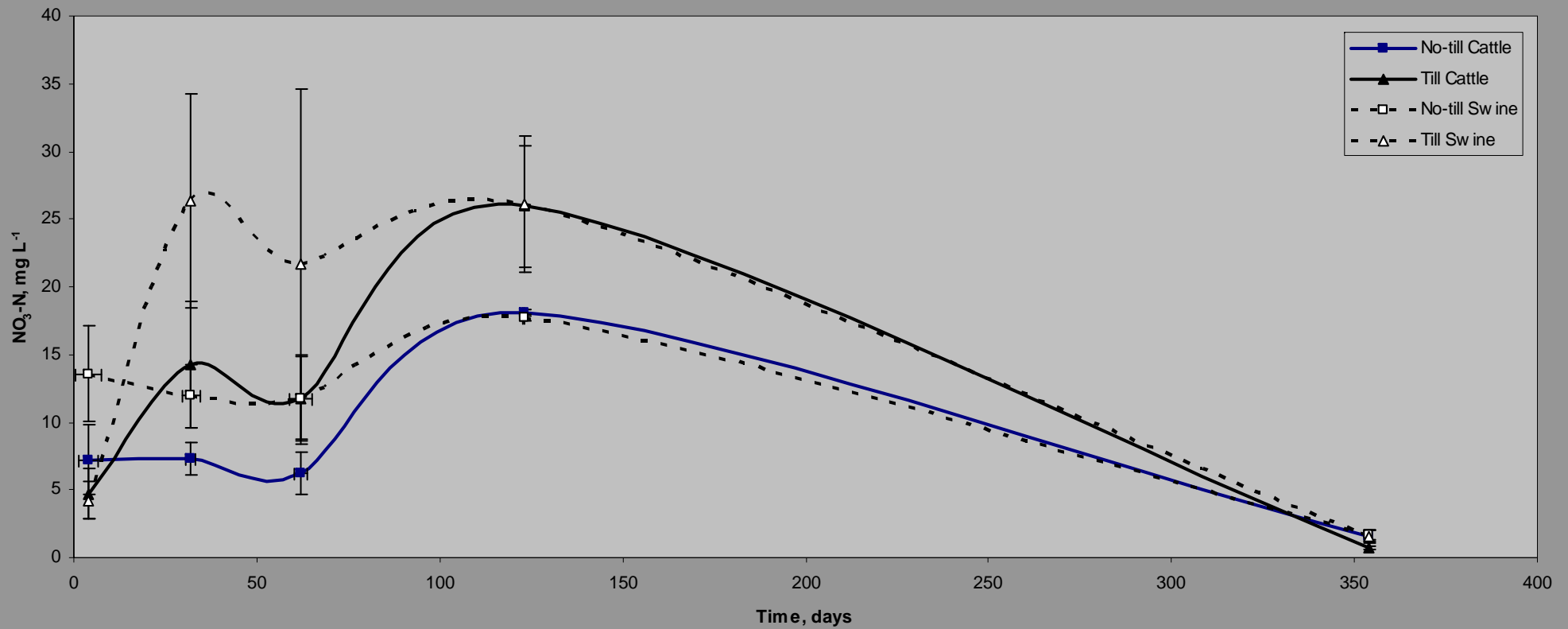


Figure 3a.  $\text{NO}_3\text{-N}$  concentrations of runoff versus time since manure application for the experimental treatments

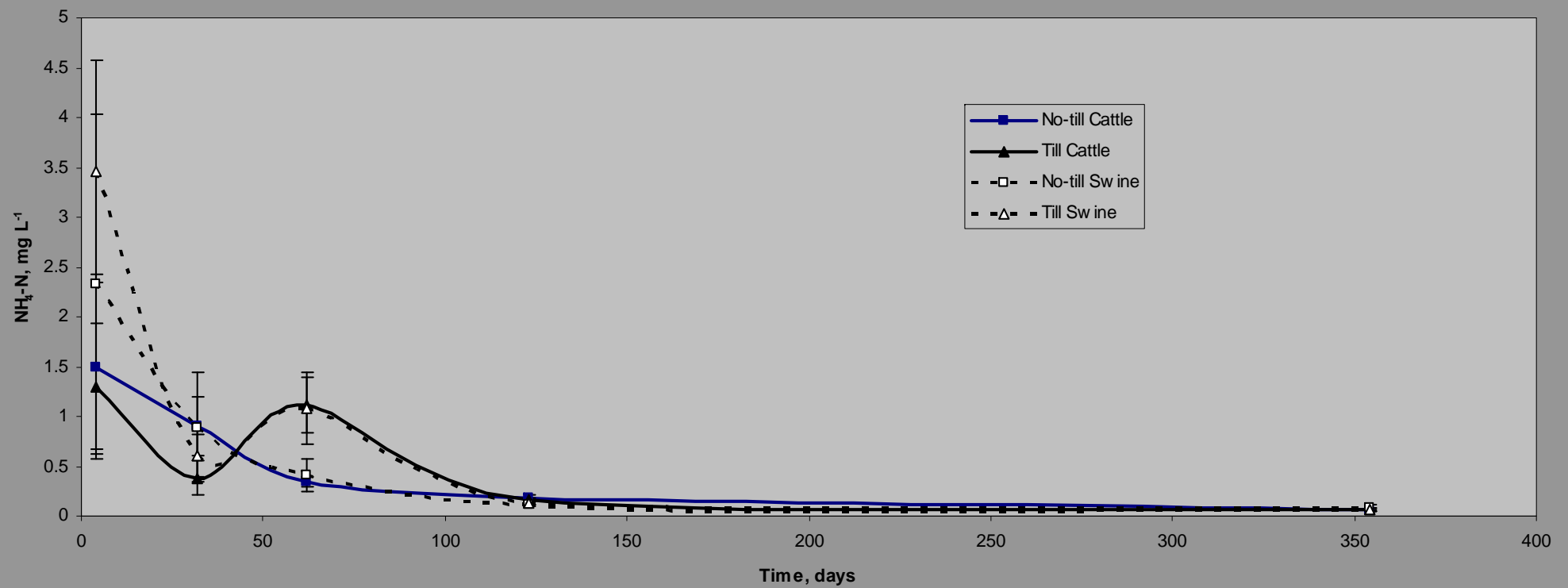


Figure 3b.  $\text{NH}_4\text{-N}$  concentrations of runoff versus time since manure application for the experimental treatments.

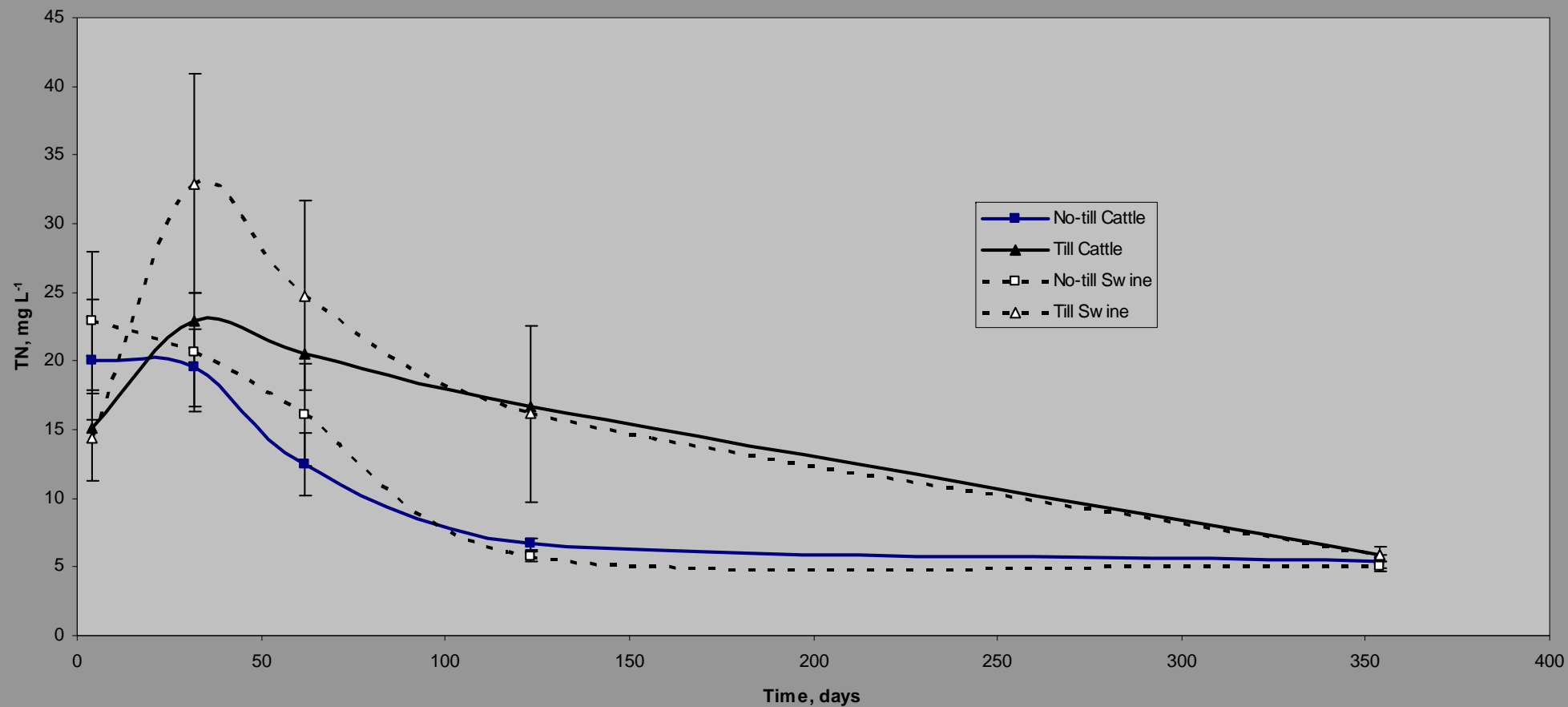


Figure 3c. Total nitrogen (TN) concentrations of runoff versus time since manure application for the experimental treatments.

# Conclusions

- Runoff concentrations of DP, TP, and  $\text{NH}_4\text{-N}$ , in general, declined throughout the year on both the no-till cattle and no-till swine manure treatments
- Tillage did not significantly affect runoff concentrations of DP, PP, TP, or  $\text{NH}_4\text{-N}$  on the swine manure treatments, but significant variations in these variable were measured over time

# Conclusions

- Under no-till and tilled conditions on both the cattle and swine manure treatments, the smallest concentrations of DP,  $\text{NO}_3\text{-N}$ ,  $\text{NH}_4\text{-N}$ , and TN in runoff occurred on the final test date.
- Tillage had less of an impact on runoff nutrient transport from cropland areas than length of time since manure application

Thank You For Your Attention

