Phosphorus – Historical Agricultural Inputs and Balance in the Lake Erie Basin

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Overview

- Historical phosphorus inputs
  - Fertilizer P application trends
- Animal number trends
  - Cattle, poultry, and swine
- Cropping system trends
  - Total acreage, corn, soybean, wheat, and hay production
- Phosphorus balance
  - Animal waste P, fertilizer P, and crop removal
Phosphorus Sales Trends

- Ohio statewide (1955-2006)

About 50% of the total amount of phosphorus sold in Ohio is sold in the Lake Erie Basin (we will use this later)

Since the early 80s phosphorus sales have dropped and stabilized
Animal Number Trends

- Cattle in the Lake Erie Basin (1975-2006)

![Chart showing cattle trends](chart.png)

Animal Number Trends

- Swine in the Lake Erie Basin (1974-2006)

![Chart showing swine trends](chart.png)
Animal Number Trends

- Cattle numbers have decreased significantly
- Swine numbers have held steady
- Did not conduct analysis to look at size of operations

Cropping System Trends

- Statewide and Lake Erie Basin (1960-2006)
Cropping System Trends

- Statewide and Lake Erie Basin (1960-2006)

In the Lake Erie Basin, corn and soybean acres have not changed appreciably since the late 70s (unlike what has happened at the state level)

- Wheat acreage has been constant
- Hay acres have decreased and soybean acres have increased
Phosphorus Balance

- Annual ag statistics 1975-2006 was used
  - Census numbers were used for all cattle and all swine
    - Phosphorus values were determined from Midwest Planner Book Values (Section 18)
      - Assumed all cattle was lactating dairy cows @ 1400 lb that produce 50 pounds of milk per day
      - Assumed all swine was lactating sow @ 375 lb

- Census numbers were used for corn, soybean, wheat, and hay acreage and yield
  - Removal was calculated by multiplying total production (bushels or tons) by P$_2$O$_5$ and K$_2$O concentration (lb/bu or lb/ton)
Phosphorus Balance

- Excess P$_2$O$_5$ trend in the Lake Erie Basin (1975-2006)

![Excess P2O5 trend in the Lake Erie Basin (1975-2006)]

Data Deficiencies

  - It is in the ballpark though
- Do not have animal numbers more delineated to a better estimate of manure produced
- This analysis does not include oat production data
Tillage and Cropping Systems

- Very little true no-till production for complete crop rotations
  - Typically corn is tilled (also coincides with application of P fertilizer)
  - Soybean and wheat is typically no-till without fertilizer addition

Tentative Conclusion

- Animal numbers (at least cattle) have decreased significantly from the 1970s
- Fertilizer P sales have decreased significantly since the 1980s
- Crop acreages in the Lake Erie Basin of Ohio have stayed steady
  - Exception – hay acres down soybean acres up
- Phosphorus is approaching a balance (in fact in 2006 it was negative)
Thanks!!!

- Questions?
- Useful webpages
  - Agronomic Crops Team
    - http://agcrops.osu.edu/
  - OSU Fertility web page
    - http://agcrops.osu.edu/fertility
  - Crop Observation and Recommendation Network (CORN)
    - http://corn.osu.edu/