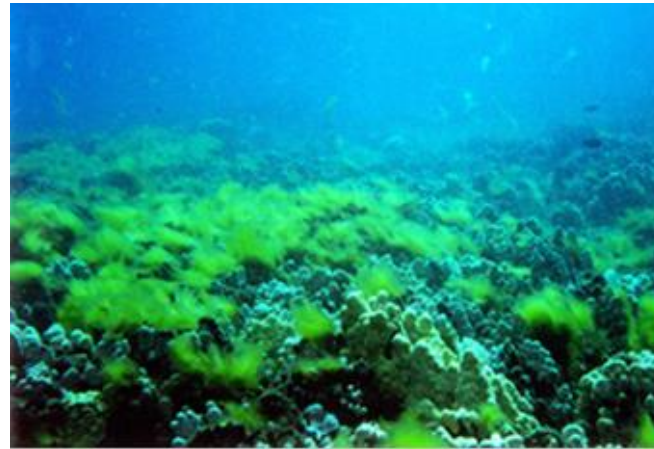


# Soil On (a little bit) of Drugs

The effect of ultralow-dose antibiotics exposure on soil nitrate and N<sub>2</sub>O flux

Stephanie DeVries

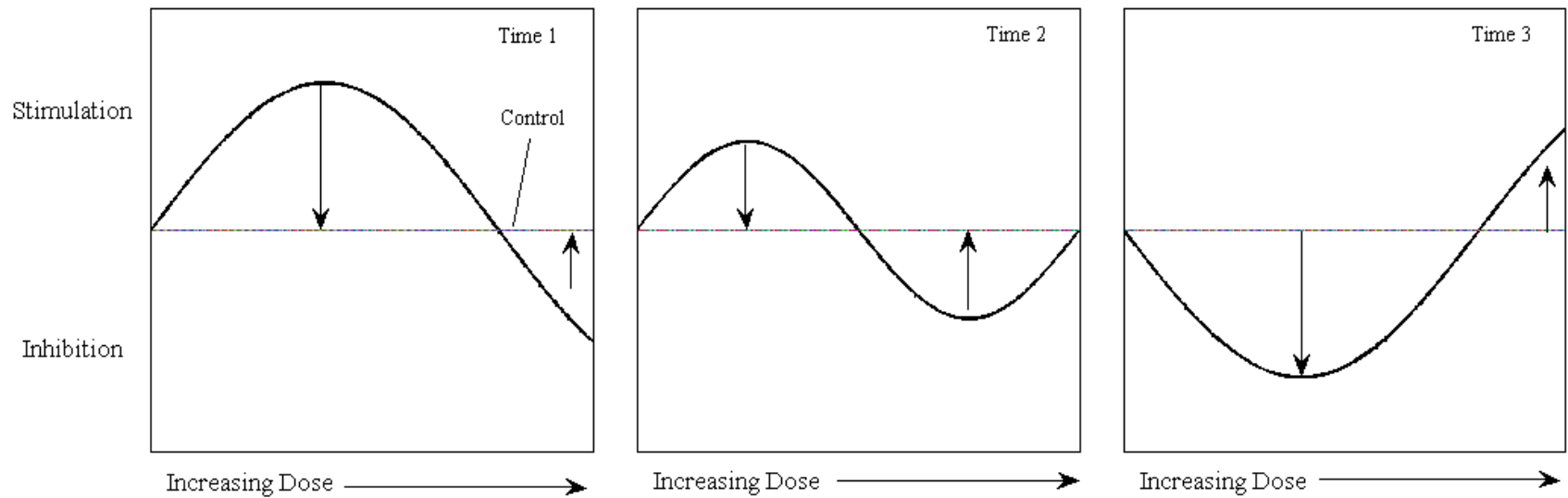
# A little bit of history...



# How does this affect the nitrogen cycle?

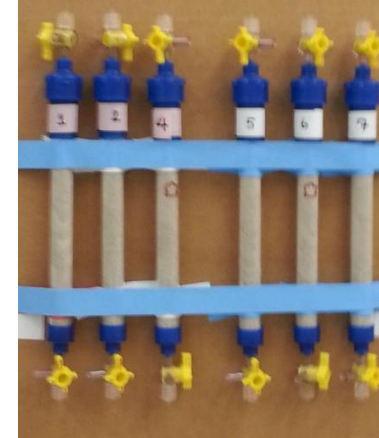


# Hormesis?

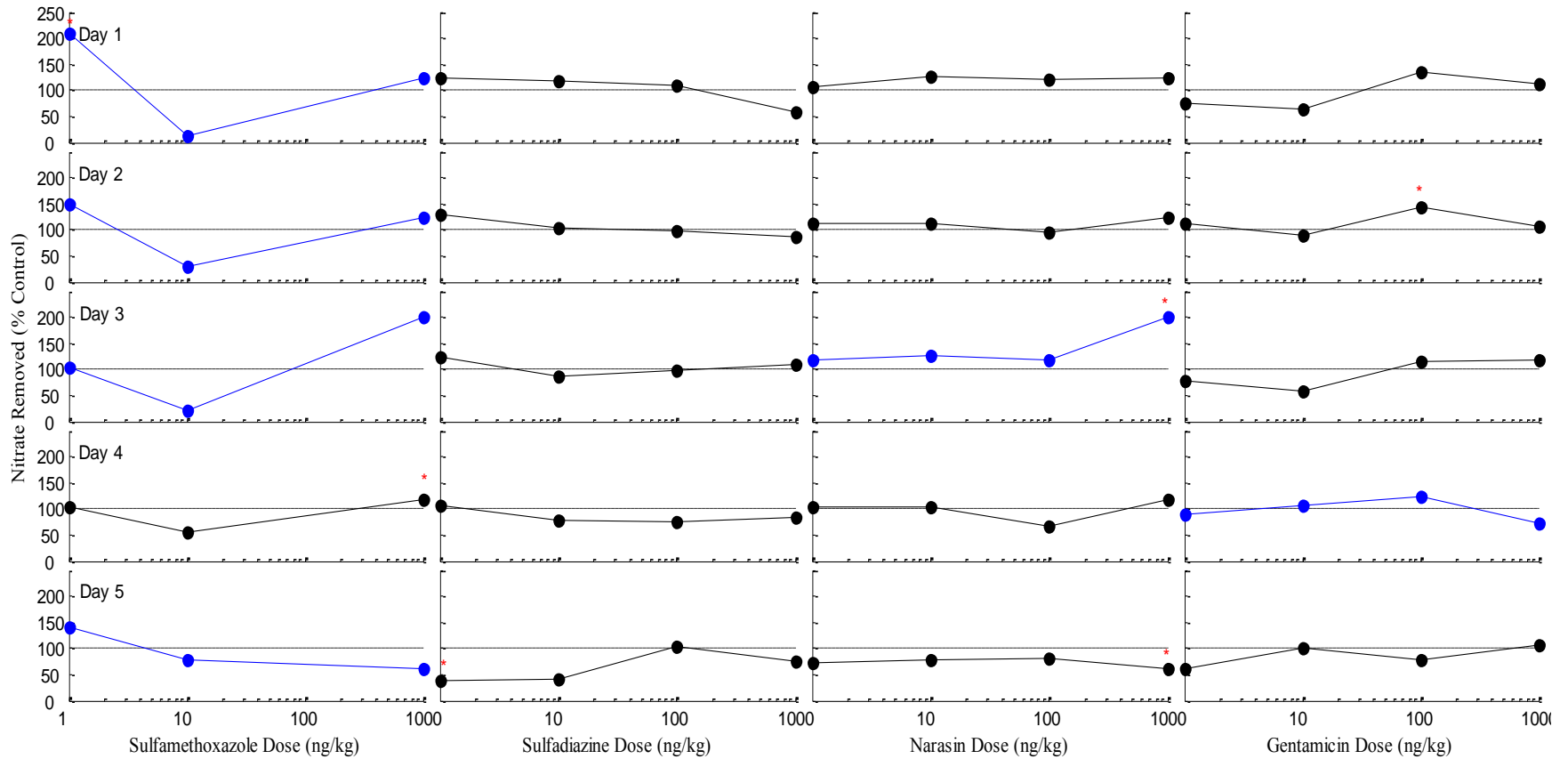


# Three Experiments

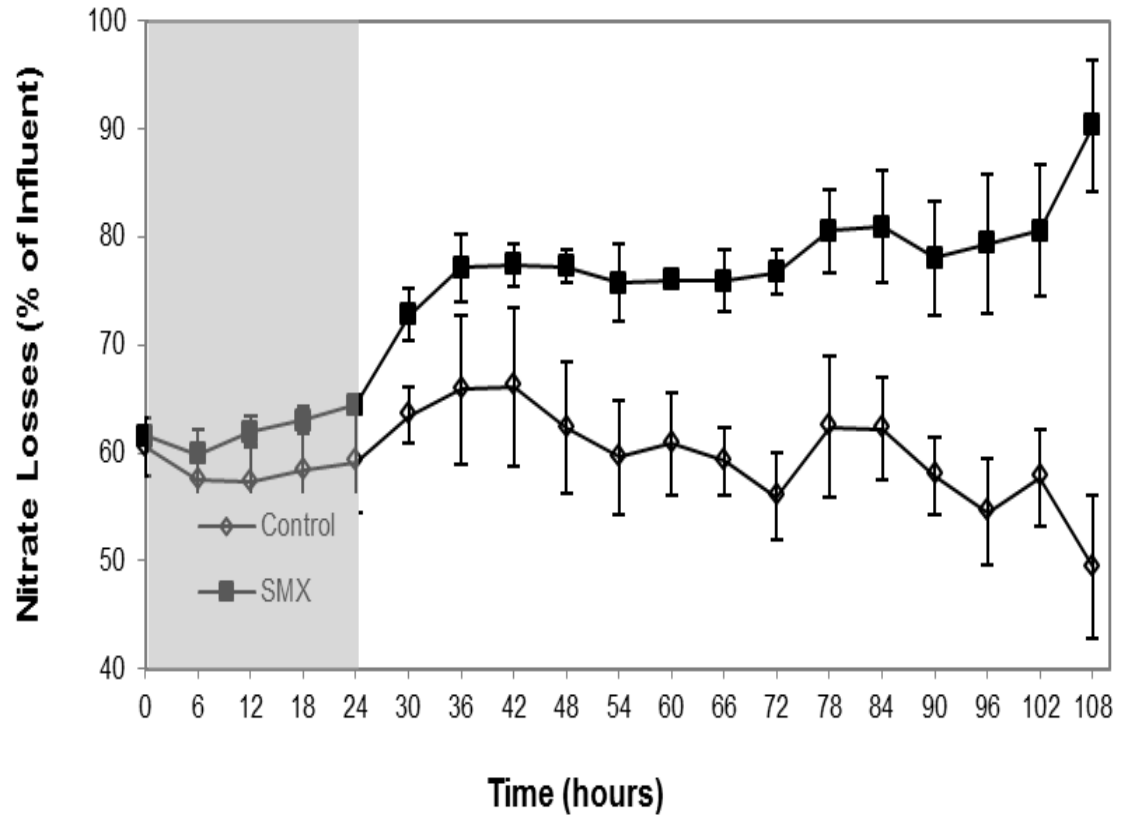
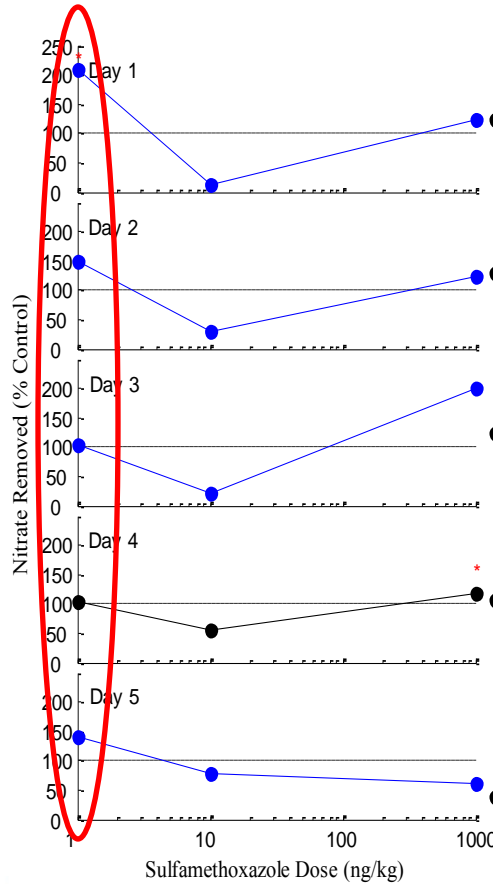
- Anaerobic denitrification in soils
- Anaerobic denitrification in column transport experiments
- $N_2O$  flux from aerobic soils



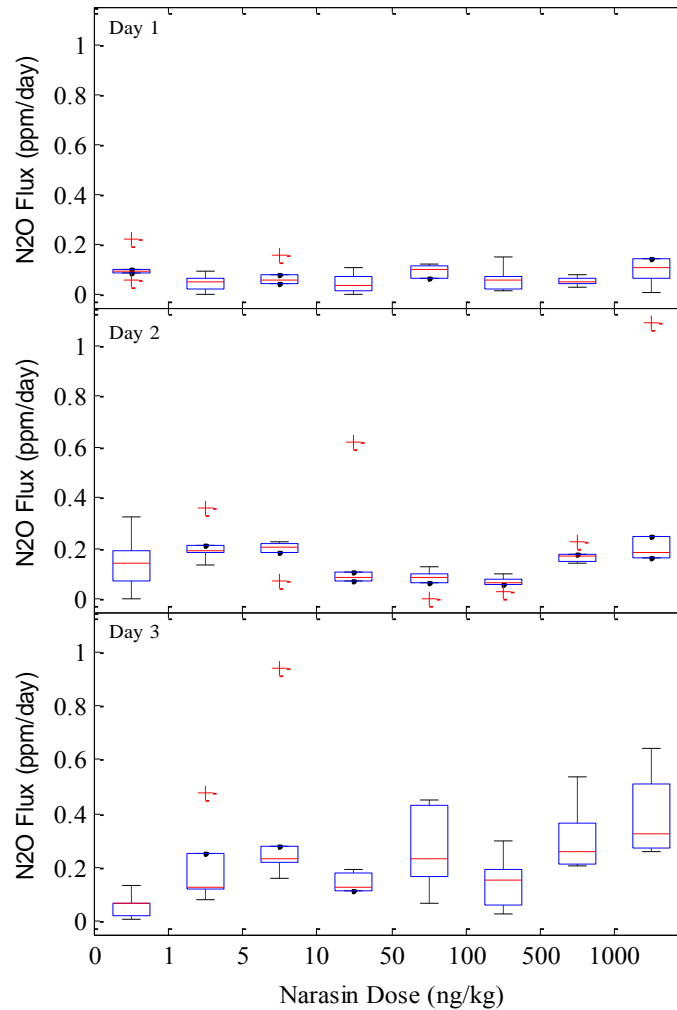
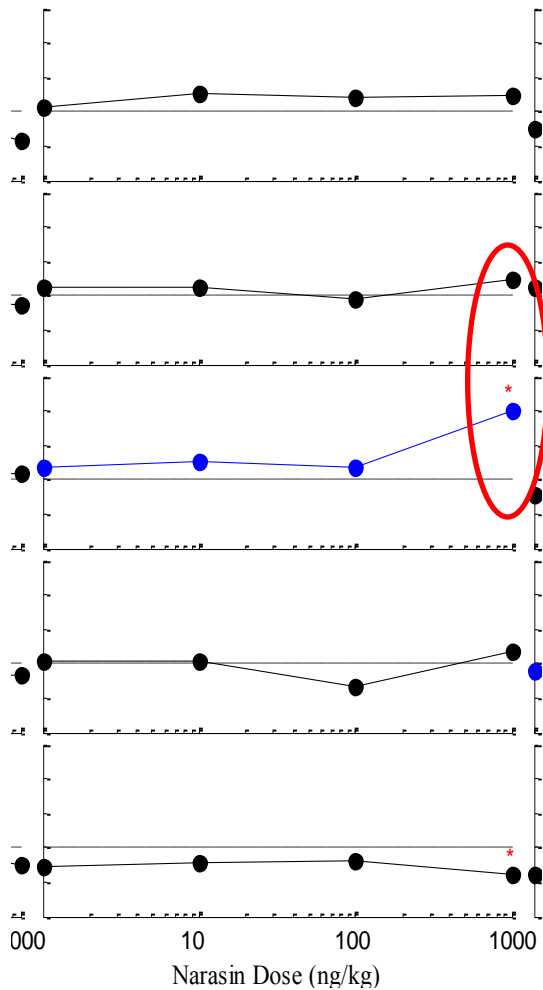
# Nitrate Losses in Anaerobic Soils



# Nitrate Removal in Anaerobic Columns



# N<sub>2</sub>O Flux from Aerobic Soils





# Implications

- Environmentally relevant concentrations of antibiotics may have a measureable effect on the microbial N-cycle.
  - Increases in  $N_2O$  flux?
  - Changes to soil nutrient content and plant availability?
  - Changes in nitrate leaching potential from agroecosystems?

# Future Directions

- Dose-response testing of nitrifying/denitrifying organisms.
- Additional incubation tests to explore a more diverse set of antibiotics.
- Long-term incubations – do short term impacts dissipate over time/adaptability of organisms?
- Field tests of  $N_2O$  flux.

# Acknowledgements and Thanks

- Dr. Pengfei Zhang, City College of New York
- Dr. Kevin Kroeger, USGS at Woods Hole, MA
- Dr. Brett Branco, Brooklyn College
- Dr. Xiqing Li, Peking University, Beijing, China
- Madeline Loving
- Laura Logozzo

This work is partially supported by the Northeast Sustainable Agriculture Research and Education (SARE) program (project # GNE13-057). SARE is a program of the National Institute of Food and Agriculture, U.S. Department of Agriculture.