profitability. The final part of the program allowed the teams to present their water system design, fence layout, and forage species selection for comment and discussion by the other participants and the instructors. To provide information and support after the meeting, each participant was given a subscription to a bimonthly grazing newsletter and was encouraged to attend a local grazing council that meets regularly.

Eleven "Pasture for Profit" schools were conducted in 1994 and 1995, involving over 400 producers. These regional schools offered an enhanced instructor/student ratio of 1:15, compared with 1:50 at previous statewide conferences.

Through a pre- and post-test instrument, participants were asked to list their top three reasons for considering MiG. Before the school, producers' reasons were to extend the grazing season, increase productivity, and utilize resources better. After participating in the school, graduates were asked what they thought about MiG. Of the 134 respondents, 94% planned on implementing MiG and thought it would significantly increase their net returns. Also, 71% considered the environmental benefits of MiG (better land and soil management) to be a major advantage.

The Ohio Regional Grazing Schools provide an introduction to the art and science of MiG. With this background, participants have a basic understanding of plant and animal science, as well as grazing management. Participants also are provided with a resource notebook and are able to network with other graziers from the school and with local grazing councils.

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Nitrogen: It doesn't just go away

In an otherwise fine article on environmental policy and swine manure management (AJAA 10(4):163-166), Dana Hoag and Fritz Roka make a serious omission in their accounting of nutrient cycling in swine manure management. Without intending to, they imply that nutrients in anaerobic lagoons are "reduced." In fact, as the authors state, from 70 to 95% of the nitrogen in anaerobic lagoons is volatilized to the surrounding atmosphere (Midwest Plan Service, 1985). Nutrients are not reduced—the N is released into the atmosphere as ammonia, and soon returns to the soil in precipitation and dryfall. Perhaps the authors believed that the gaseous N was transformed to N_2, but this does not occur.

Data showing increased atmospheric N deposition related to livestock production are available from the Netherlands. Currently, the Netherlands receives an annual average of 45 kg/ha of N from atmospheric deposition, which is 10 times the natural background. The greatest deposition (50 to 65 kg/ha) occurs in the southeastern part of the country, where the livestock industry is the most intensive (Berendse et al., 1993; Sutton et al., 1993). On a local scale, soil nitrate increased and pH decreased in the immediate vicinity of a poultry farm (Berendse et al., 1993), demonstrating that much of the ammonia "lost" to the atmosphere during manure storage did not go very far. This eutrophication has caused substantial damage to forest, dune and heathland ecosystems. Conservation area managers are now scratching their heads, trying to figure out ways to truly "reduce" nutrient loads in their endangered habitats (Marrs, 1993).

It is important to acknowledge that nutrients are never "lost", just redistributed. Because of this misperception, operators of anaerobic lagoons routinely and quite legally discharge nutrients to the environment.

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Authors' response:

Laura Jackson makes an important point about our not accounting for nitrogen cycling at all levels. While we agree with her, this was not a central issue to the question we addressed.

We were starting from the premise that hogs will be produced and that in turn they will produce manure. Our question was related to cost effectiveness and policies to direct nitrogen off the farm through volatilization and crop uptake. The term "lost" in this context simply means it is removed from the farm and is no longer a management problem for the producer.

Ms. Jackson points to a need to examine further how society chooses to deal with nitrogen from manure. Currently farmers face more criticism for nitrogen going into water than that which is volatilized; they are simply making good economic decisions. Her comment emphasizes a need to examine whether we have inappropriately transferred nitrogen from one environmental sink to another.

This is a systems problem that will require contributions from many disciplines. We think that we have made a contribution by expanding the way nutrient management has been addressed. We hope that our work will stimulate further research that addresses the comments by Ms. Jackson and others.

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