gross and increasing ecological imbalance, as well as to the disruption of Thai society, which contributes to the growth of drug and prostitution problems in Bangkok.

Bond offers many more specific examples of the pernicious effects of EU and World Bank policies on developing nations. Wheat imports in Burundi and EU-subsidized beef in Togo have undermined the local pastoral economies, creating dependence on EU surpluses. In Botswana, promotion of beef exports has led to overgrazing and range degradation; World Bank promotion of cacao plantations in West Africa and elsewhere led first to rainforest destruction and then to economic catastrophe for the exporting countries, as cacao prices plummeted as a result of predictable overproduction.

Rural destruction through "modernized" agriculture affects Europe as well as the developing world. Bond recounts how 58,000 Spanish dairy and cattle farmers are being forced out of business by lower-priced industrial farm output encouraged by EU subsidy and quota policies. He criticizes EU and World Bank bureaucracies for their remoteness from farmers, their failure to understand grassroots agriculture and the importance of diversity, and their insensitivity to the effects of their policies. While he favors sweeping away much of the transnational bureaucracy that promotes these damaging policies, he is no supporter of unfettered free markets. Rather, he feels that political organization is essential to bring the concerns of farmers and of local communities back to the center of policy making. He looks to nongovernmental organizations (NGOs) to help integrate agricultural and environmental policies, but feels that most NGOs still lack the necessary experience and competence to take on this task.

While strong on denunciation of current failed policies, the book is limited in its suggestions for alternative paths. Like others, Bond calls for a new development paradigm, based on a local focus and an effort to make agriculture compatible with both biophysical and socioeconomic environments. He opposes current European policies of land set-asides combined with intensive production; instead he favors extensification, which necessitates better land use planning and appropriate uses for marginal lands. While he generally advocates the use of organic techniques, he sees intensification and increased fertilizer use as essential for the developing world, especially in areas of high population pressure.

Is it possible to envision an environmentally friendly agriculture that offers farmers a decent income while supplying the needs of growing populations at moderate prices? Bond suggests that it is, but leaves many of the details — and potential policy conflicts between the needs of farmers, consumers, and the environment — unexplored. He does make a convincing case that we can do much better than we do now by abandoning many of the disastrous policies now so enthusiastically pursued by the European Union and the World Bank. The shaping of possible alternatives is left sketchy, and no doubt others will step in to analyze the potential for a truly sustainable agriculture, which surely will require sweeping changes both in institutions and in techniques.

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LETTERS TO THE EDITOR

Regional grazing schools in Ohio

The article by Rust et al., "Intensive rotational grazing for dairy cattle" (*AJAA* 10(4):147-151) covers a topic that is very timely not only for dairy farmers, but also for other livestock producers. Intensive rotational grazing, strip grazing, Voison grazing, and rationed grazing are similar systems for improving pasture management to reduce production expenses for meat and milk and to enhance farm profitability.

We have found that to maintain production, management must be substituted for the decrease in inputs with these grazing systems. Therefore, we use the term "Management-intensive Grazing" (MiG), coined by Jim Gerrish of the University of Missouri. With all the fervor for this system, a concern has developed for educating producers about the management principles related to MiG so that they can reap all its benefits.

Since 1986, several events, programs, and workshops relating to MiG have been conducted in Ohio. In 1994, an Integrated Forage Management (IFM) team consisting of state specialists, Extension agents, and Natural Resource Conservation Service representatives was formed in Ohio to focus educational programs on improving the profitability of Ohio farmers and enhancing the environment through efficient use of forages. One goal of the IFM team was to develop an expanded curriculum and offer "Pasture for Profit" schools on a regional basis.

Ten teaching outlines were developed by IFM team members for the schools. The topics include: What is Management-intensive Grazing?; Evaluating Your Resources; Goal Setting; Understanding Plant Growth; Soil Characteristics and Fertility; Forage Species Selection and Management; Matching Plant and Animal Requirements; Paddock Design and Water Systems; Economics of Grazing; and Feeding Dairy Cattle on Pasture. Each teaching outline included a script and either 35mm slides or overhead transparencies, and scripts developed by members of the IFM team for other instructors throughout the state. In addition, each outline had a corresponding set of educational materials incorporated into a notebook and provided to each participant. Finally, each teaching outline included a factsheet that will be distributed statewide.

These outlines were covered in two or three sessions consisting of five to eight hours of classroom instruction. Then a "hands-on" outdoor meeting was provided on a case farm to allow participants to gain practical experience from the instructors and experienced graziers. During the outdoor meeting, participants were divided into teams that competed to design the best plan for the case farm. An experienced grazier assisted the team, answering questions while the teams walked the farm to understand and appreciate all its resources.

Then, teams designed a system to optimize forage use, reduce soil erosion, improve water quality, minimize forest use by livestock, minimize labor, and improve

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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