Dr. Beegle Clarifies Phosphorus Report

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developing a nutrient management plan.

In most cases, including Pennsylvania, nutrient management plans are based on balancing nitrogen. This is based on our scientific understanding of nitrogen behavior and generally greater concerns with the environmental fate of nitrogen and the potential negative human health effects of nitrates in water.

At the same time, we have long recognized that one of the consequences of basing nutrient management plans on nitrogen is that, in most cases, excess phosphorus will be applied to the soil.

This is not an ideal situation, but from our understanding of phosphorus behavior, we know that there are things we can do to minimize the environmental impact of this excess phosphorus, in many cases.

Consequently, we have consistently emphasized that, while the official guidelines for manure management are based on nitrogen, we cannot ignore phosphorus.

This is the reason for the inclusion of practices such as soil and water conservation, balancing manure applications over crop rotations, cover crops, etc., in nutrient management plans.

Research and experience over a number of years working in nutrient management has also pointed out, however, that not all of the practices that we depend on to minimize phosphorus impact on the environment are as effective as we thought, in all situations.

For example, conservation tillage will dramatically reduce the loss of sediment-bound phosphorus from agricultural fields, however, repeated excess application of manure phosphorus to the soil surface can result in extremely high soil phosphorus levels at the soil surface.

Under normal conditions, soils have a large capacity to adsorb ("adsorb" means to cling to, while "absorb" means to "incorporate") and hold phosphorus, thus phosphorus solubility in the soil is generally very low.

However, within the high phosphorus microenvironment at the soil surface, the phosphorus adsorption capacity of the soil may become saturated to the point that water running over this soil surface can pick up significant amounts of soluble phosphorus and transport it from the field to water bodies.

This is not a "turnaround in what has been considered scientific fact," but application of our constantly improving understanding of phosphorus behavior to a different and changing set of circumstances.

This is an example of why we need to continually do research and evaluate our experiences regarding what we know about phosphorus behavior and management in context of changing conditions.

As I stated earlier, the compromise required when making a decision between nitrogen and phosphorus is not an ideal situation.

Some people want to take the black-and-white point of view of the issue and propose a zero-tolerance position that no excess phosphorus be applied.

This is the approach being proposed in Maryland. However, as noted in the article, the implications of this approach are very serious for animal agriculture.

Because we believe that there are effective and practical alternatives to this zero-tolerance approach, research has continued on agricultural phosphorus, its potential impact on the environment and possible management strategies.

The emphasis of this research, which has been ongoing on a national scale, for some time, has focused on gaining a better understanding of the behavior of phosphorus, especially in systems where excess phosphorus is being applied, and looking for practical strategies for further minimizing the effect of agricultural phosphorus on the environment.

For example, recent research has shown that a majority of the phosphorus lost to water comes from a limited area in most water-

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