Managing Agricultural Phosphorus to Protect Water Quality

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Concern about agricultural nutrients and water quality is nothing new in Colorado, but in the past most of our attention was focused mainly on impacts from nitrogen. Phosphorus (P) is now receiving attention nationwide as an important surface water pollutant. Surface water that receives P due to soil erosion or nutrient runoff from feedlots, fields or lawns suffers from accelerated eutrophication. Eutrophication is the natural aging of lakes or streams brought on by nutrient enrichment. Eutrophication has been identified by the EPA as the main cause of impaired surface water quality across the country. This decline in water quality restricts use for fishing, recreation, industry, and drinking due to the increased growth of undesirable algae and aquatic weeds and the resulting oxygen shortages caused by their death and decomposition. Recent outbreaks of the dinoflagellate *Pfiesteria piscicida* in the eastern United States, and Chesapeake Bay tributaries in particular, have dramatically increased public awareness of eutrophication and the need for solutions. In Colorado, reservoirs such as Cherry Creek, Dillon, Chatfield, and Barr are known to be impaired from excess P in inflows.

Agriculture is not the only source of P in the aquatic environment. For example, the USGS estimates that of 40,000 tons of P that enter the S. Platte River Basin each year, almost 1,000 tons annually are from municipal waste discharges directly into the river. Manure and fertilizers applied to cropland and lawns make up the bulk of the P load in most river basins and have been identified by the EPA as needing attention.

One of the difficulties in achieving better management of P fertilizer and manure is the disparity between critical lake and soil P concentrations. Lake water concentrations of P above 0.02 ppm generally accelerate eutrophication and these values are an order of magnitude lower than P concentrations in soil solution critical for plant growth (0.2 to 0.3 ppm). Continual long-term application of fertilizer or manure at levels exceeding crop needs will increase soil P levels. Most livestock producers apply manures at rates that meet crop N requirements and avoid ground water quality problems created by leaching of excess N. Nitrogen based management has been advocated by Extension and other crop advisers for many years. The result is a buildup of soil P to excessive levels over time. In many cases we now will need to

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A Message From Your Extension Dairy Specialist......

This month I would like to bring three things to your attention -

First, the Environmental Protection Agency (EPA) proposed strict new controls on concentrated animal feeding operations (CAFOs) late last month. As many as 39,000 CAFOs could now be required to have enforceable permits, up from the 2500 currently permitted. CAFOs are defined as operations with a thousand or more animal units (700 dairy cows). In addition, small operations would be required to obtain water permits if they are considered a threat to water quality. Copies of the proposal can be obtained from CSU or from various Colorado animal associations. Public comments on this new proposal will be taken during the next 120 days.

Second, the effects of excess phosphorus on water quality have become a hot issue. Reagan Waskom from CSU has been kind enough to write an article on this issue and provide us with the USDA -NRCS phosphorus guidelines. I urge you to keep these handy.

Finally, as you know, I believe strongly that the more dairy producers know about marketing products and futures trading, the better equipped they will be to face some of the challenges of our industry. Low milk prices necessitate better business skills, cash flow management, and careful attention to market information. As a helpful source I recommend the Daily Dairy Report, a market information update provided by Mary Ledman and Allen Levitt and distributed courtesy of Chicago Mercantile Exchange Incorporated. It is available online < subscribe@dailydairyreport.com >.

Hope to see you later this month at the Nutrition Conference and Dairy Days in Greeley.
Malignant catarrhal fever is a viral infection of ruminants that is most commonly seen in cattle. The disease is highly contagious and can be transmitted from infected animals to other susceptible animals through various means, including direct contact, aerosol transmission, and through the colostrum of an infected dam. Recent research suggests that sheep may also play a role in the transmission of the disease, as they are known carriers.

The virus, MCF, is caused by a viral pathogen that is unresponsive to antibiotics. Therefore, the management emphasis should be on identifying risk factors, correctly diagnosing the disease, and implementing preventive measures. There is no effective treatment for the disease, so the focus is on preventing its spread.

Diagnosing MCF is most accurately performed by examining tissues from the animal after it has died or been euthanized. There are two blood tests for the disease: the enzyme-linked immunosorbent assay (ELISA) that looks for antibodies to OHV2 and the polymerase chain reaction (PCR) which identifies the viral DNA in infected cells within the blood.

Since MCF is caused by a viral pathogen, there is no known cure for the disease. Prevention is key, and this involves identifying and isolating infected animals, implementing biosecurity measures, and practicing good herd management practices. "The Vasculitis can manifest itself in many ways. The most common form of the disease is in its final stages and there is no effective treatment for the animal.

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recommend P based management, significantly increasing the number of acres needed to accommodate all of the manure produced.

The example calculation below shows that manure rate can change from 20 tons per acre to 7 tons per acre when going from an N to a P based recommendation. Dairy operations in specific are going to need to evaluate their annual manure production and the land base available for safely accommodating the nutrients in the waste. In some cases, altering feed rations may be the best way to improve manure management.

Example of how P based nutrient management could change the recommended manure application rate at a hypothetical dairy*

<table>
<thead>
<tr>
<th>Manure Nutrient</th>
<th>Nitrogen</th>
<th>Phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available in 1st Year(lbs/ton)</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Corn fertilizer requirement(lbs/acre)</td>
<td>200</td>
<td>80</td>
</tr>
<tr>
<td>Recommended manure rate (tons/acre)</td>
<td>20 (N-based)</td>
<td>7 (P-based)</td>
</tr>
<tr>
<td>Supplemental N fertilizer needed (lbs/acre)</td>
<td>0</td>
<td>130</td>
</tr>
</tbody>
</table>

*Based upon table values for manure on a wet weight basis and a 200-bu corn yield goal.

The Colorado USDA-NRCS has just adopted a new nutrient management standard that includes an evaluation of P runoff risk on operations that utilize manures or other organic wastes. This risk assessment is designed to identify potential water quality problems associated with adding P fertilizer or manure to agricultural fields. The P Index ranks fields from "low risk" to "very high risk" and is intended to help producers protect water quality. At the present time, P based manure management is voluntary for dairy operations. However, be aware that the EPA and the Colorado Department of Health and Environment are considering the need for P based manure management in future permitting requirements.

For more information on the Colorado P Index, contact:
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transmission from airborne viral particles.

Accurately diagnosing the disease can be difficult since the organism has never actually been isolated and grown. MCF can look like other more common cattle disease especially pinkeye (Moraxella bovis), infectious bovine rhinotracheitis (IBR), or Bovine Virus Diarrhea (BVD). Pinkeye lesions generally start in the center of the cornea and work toward the periphery of the eye as they progress. Cattle with pinkeye generally respond to antibiotic therapy. In contrast, MCF lesions starts peripherally, move to the center of the eye, and do not respond to treatment with antibiotics. IBR ocular lesions resemble MCF lesions, but the ocular form of IBR is rarely seen in Colorado and IBR is rarely fatal. Virus isolation can be performed on ocular swabs, and antibodies can be detected in the blood for diagnosis of IBR. Bovine virus diarrhea (BVD) can cause oral ulcers, increased salivation, and diarrhea as MCF does but it does not cause eye lesions. There are PCR, ELISA, virus isolation, and serological tests to diagnose BVD.

MCF is a possible diagnosis if there is an outbreak or isolated incidence of blindness, cloudy eyes, fever, and/or increased salivation in your cattle. Since the disease is untreatable it is important to protect your cattle by maintaining distance between them and neighboring sheep. Early diagnosis and culling may help prevent spread to other animals. Ovine herpesvirus type 2, the presumed causative agent, can be identified by PCR. This test is offered by both the Colorado and Wyoming State Diagnostics Laboratories. Your local veterinarian can take a blood sample from animals on the farm and have results within a week.