United States Department of Agriculture

Conservation Innovation Grant (CIG) Fact Sheet

Project Title:

Strategically Reducing Phosphorus Excretions in Grazing Beef Cattle

Grant Recipient:

Virginia Polytechnic Institute & State University (Virginia Tech)

Other Key Project Partners:

Virginia Cooperative Extension

Project Timeline:

June 2011 to March 2014

Project Funding:

NRCS Contribution:	$30,000
Recipient & Partner Match:	$30,000
Total:	$60,000

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Summary/Abstract: The goal of this project was to conduct a controlled feeding demonstration where cattle P intake and excretion could be quantified and extrapolated to on-farm conditions reported from field sample P status results from beef cattle farms throughout the Chesapeake Bay Watershed in Virginia.

Excess P is primarily excreted in the feces.

Steer feeding demonstrations indicated that increased P supplementation, both inorganic and organic sources, increased P excretion in parallel fashion. In addition, higher levels of P supplementation resulted in a greater percentage of excreted P in the inorganic or water soluble form. Seventy percent of the forage samples collected on farms exceeded the P need of a beef cow at peak lactation and 99% of the samples exceeded the late gestation and late lactation P requirement.

The results of the farm collected fecal samples also suggest that cattle are receiving P supplementation beyond their nutritional needs. Project survey results revealed that 82% of the cattlemen would consider reducing their P supplementation if they were confident that forage was meeting their cattle P requirement. Based on the demonstration results, reduced P supplementation should result in decreased P excretion and reduced importation of P into the Bay watershed while still meeting animal nutritional requirements.

Project Objectives

- Conduct a controlled feeding demonstration where cattle phosphorus (P) intake and excretion could be quantified.
- Collect information and field samples from beef cattle farms in Virginia's Chesapeake Bay Watershed, documenting P status and supplementation.
- Extrapolate the results of the feeding demonstration to the on-farm conditions reported from field samples.

Background / Phosphorus (P) Supplementation of Beef Cattle

- P supplementation of beef cows is a commonly recommended and accepted management practice.
- Deficient P intake levels have been reported to negatively impact cow reproduction rates.
- Cattlemen are ingrained with the concept of P and bovine reproduction.
- The new TMDL proposed by EPA for the Chesapeake Bay Watershed outlines significant target reductions for sediment, nitrogen and phosphorus.
- Educating beef cattleman on the status of P in their forages and supplemental feeds will provide a more efficient, economical and environmentally friendly means of meeting their cow's P requirements.

Feces is collected for subsampling and analysis.

Methods / Plan of Action

- Two controlled feeding demonstrations were conducted to demonstrate the rela-

tionship between P intake and P excreted.

- One feed demonstration used a form of inorganic P commonly used as the P source in mineral supplements.
- The parallel feed demonstration used dried corn gluten pellets, an organic source of P, commonly used as a feed supplement on farms.
- All feed and fecal samples were dried, ground, subsampled and analyzed for inorganic and total P.
- Production surveys were completed and on-farm forage samples were collected representing over 120 locations throughout the watershed.

Results: Technical Findings

- Feed demonstrations indicated that as greater amounts of P were fed, greater amounts were excreted via the feces.
- This relationship held true regardless of the source of P fed (mineral vs. corn gluten).
- As greater amounts of P were fed and excreted, the fraction of inorganic P excreted in the feces also increased (Fig. 1).
- As the amount of P supplemented exceeds cattle requirements, the amount of inorganic (water soluble) P excreted also increases.
- The net result of feeding P above cattle nutrient needs is that a greater amount of P is excreted and a larger portion of this excreted P is in a form more vulnerable to runoff.

Results: Outreach Activities

- The demonstration results were shared at 3 regional summer producer field days and one county meeting reaching nearly 500 cattlemen.
- An article was published in the VA Cattlemen's Magazine.

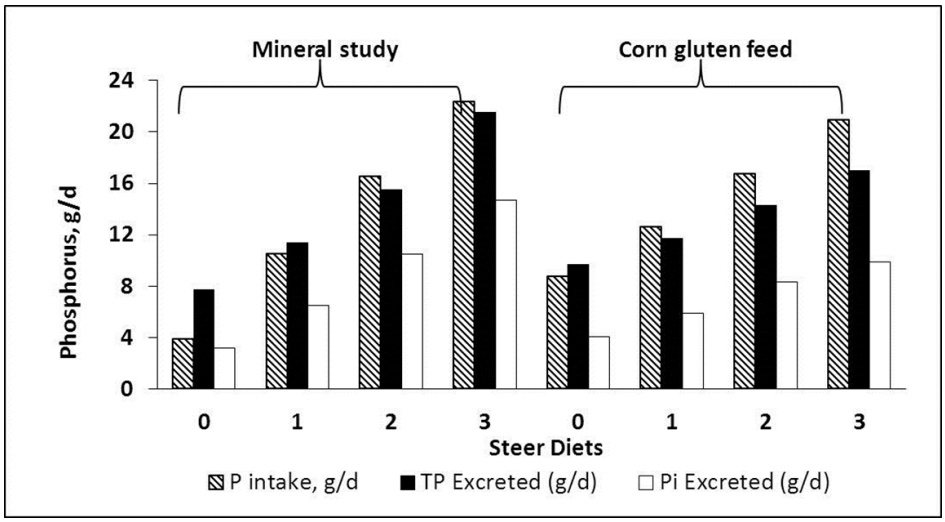

Figure 1: Phosphorus intake and excretion as influenced by amount of supplemental P

- Based on the project results three regional Cattlemen Associations now offer a low P mineral mix to their membership.
- A face-to-face meeting was held with a major formulator and marketer of livestock mineral in VA and the southeast U.S., to share results and discuss the possibility of adding more low P mineral choices to their offering.
- An Extension publication was produced based on project results providing producer recommendations.

Conclusions for Farmers

- Phosphorus status of our waterways is affected by both agricultural and non-agricultural activities in the watershed.
- Overfeeding P to beef cattle simply leads to greater fecal P excretion, much of which is in the higher risk, inorganic form.
- By monitoring forage P content and selecting the correct mineral, fecal P excretion can be minimized at both an environmental and economic benefit.

Conclusions for Policymakers

- Evaluating the farm P status, by sampling and analyzing forage and/or fecal samples, provides the basic information needed to determine if cattle are receiving enough P to meet their requirements.
- Matching P supplementation to cattle P requirements, based on sample analysis, is a strategic management practice that can reduce P imported into the Chesapeake Bay Watershed.

References / For More Info

1. Poster Presentation: P Status of Grazing Beef Cattle Farms in VA
2. Final CIG project report
3. Beef Cattle P Calculator Worksheet
4. Extension web publication titled: Optimizing Phosphorus Supplementation of Grazing Beef Cattle on the Beef Extension Website

Alston Horn, a field technician with the Chesapeake Bay Foundation, collects and analyzes fresh forage samples to use as a decision making tool.

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