

Nutrient Management

DAIRY &
ANIMAL
SCIENCE

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Phosphorus Fact Sheet

- ❖ Phosphorus has now become a major concern in nutrient management. Due to runoff and erosion, increased P in water stimulates algae blooms, which could deplete the dissolved oxygen, and cause fish kills. This process is known as eutrophication.
- ❖ Regulations to control P losses to bodies of water are on the horizon. In the Chesapeake Bay area, Maryland has begun implementing a P-based nutrient management plan, and a P-based regulation is forthcoming in Pennsylvania.
- ❖ Under a P-based nutrient management plan, minimizing the P content of animal manure is critical.
- ❖ The fundamental way to decrease manure P is to reduce ration P to the recommended levels.
- ❖ According to a 2001 survey, PA dairy producers are feeding an average of 0.44% P to the high producing group and 0.39% P to the low producing group, compared to 0.35-0.38% recommended by the NRC.
- ❖ Reducing P to the NRC levels in PA dairy rations could result in a 25% decrease in manure P, and reduce the land requirement for manure application from 1.8 to 1.5 acres per cow per year.
- ❖ Reducing P could also save up to \$15 per cow per year on P supplementation, or \$9 million annually in Pennsylvania.
- ❖ Reducing P to the NRC levels will not affect animal performance or health.
- ❖ Most dairy rations contain enough P from forages and grains without the use of supplemental P sources.

Ten Factors to Consider Regarding P in Dairy Rations

1. Understand the 2001 NRC P requirements.

- Total absorbable P requirement:
Lactation = 0.41 g/lb of milk
Pregnancy = 2.5 g/day
Growth = 2.5 g/lb of weight gain
Maintenance = 0.45 g/lb of DMI
- Dietary P requirement: divide the absorbable P by feed P availability coefficients.

2. Know the safety margins with NRC.

- Feed P availability values used are reasonable but conservative.
- 0.35-0.38% P does provide a safety margin.

3. Consider P mobilization and restoration of bone when formulating diets.

- Credit P mobilized from bone in early lactation.
- Allow for P to be restored in late lactation.

4. No adverse effects on milk production or bone strength with NRC levels.

- Proven by research.
- Some of these studies conducted over three years for differing amounts of P.

5. No beneficial effects on reproductive performance by feeding additional P.

- Early observations of poor reproductive performance associated with P deficiency were complicated by poor energy and protein nutrition.
- The amounts of P cows received in the early studies that established the role of P in reproductive performance were much lower than the current NRC levels.

6. No need to be concerned with Ca : P ratio if reducing P to the NRC levels.

- Ratio does not have as great an effect as once thought.
- Ruminants can tolerate ratios of up to 7:1.

7. When the forage proportion of the diet is changed, there does not seem to be a need to adjust dietary P.

- Little influence of forage content on P excretion.
- Adjustment is in NRC availability factor.

8. When choosing a protein supplement, consider how much P it will add.

- Protein supplements are generally high in P, and are purchased most often.
- Selection can minimize P importation.

9. Analyze feedstuffs.

- The P content of some feeds has increased over the years and deviated from "book values".
- Variation could be large.

10. Test fecal samples for P content.

- Fecal P can reflect P intake relative to the need.
- If the average fecal P content is above 0.8% (DM), dietary P is likely too high.