

CAN WE IMPROVE PREDICTION OF PHOSPHORUS BIOAVAILABILITY FOR COWS?

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Summary

Phosphorus (P) is an instrumental nutrient in numerous physiological processes, but can have detrimental environmental impact if fed in excess. Increased P intake in dairy cows leads to increased fecal excretion of P and a reduction in efficiency of use. Variability in P concentration or availability in feedstuffs can exacerbate P excretion. Our research group is conducting several experiments to work to improve prediction of P availability to cows. To investigate variability in P between and within feedstuffs, 170 feed samples (forages, concentrates, and by-products), were collected from across the U.S. and analyzed for total P, inorganic P, and phytate. Forages contained a greater proportion of P in the inorganic form and less total P and phytate as compared to concentrates and by-products. The majority of total P was associated with inorganic P and phytate.

To assess large intestinal digestibility of phytate, an experiment was conducted in dairy heifers using ileally infused phytate, followed by collection of feces. These data indicate that there are biologically important implications of digested phytate species and furthermore some absorption of P from the large intestines. A third experiment was conducted in lactating dairy cows to investigate the effect of phytase use and forage particle length on P availability. Total P intake of the four diets was similar. Total tract digestibility of total P tended to be reduced and total P excretion was increased with phytase supplementation. There was no effect of phytase supplementation or forage particle length on milk yield or components. Variation in P compounds between feeds, and the P flow data generated in these experiments suggest opportunity for improvement in prediction of P availability from feeds for dairy cows.