Phosphorus feeding for transition dairy cows
Preliminary results

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Introduction

Phosphorus-rich soils are considered among the most important reasons for fresh water eutrophication. In dairy operations, P enters the property mainly as fertilizers and animal feed. Farmers have historically fed between 0.48 – 0.50 % P in the diet dry matter (**DM**) to lactating dairy cows. Those levels are well above recommendation (NRC, 2001). Resistance to change is mainly because of reproductive concerns. The combination of these factors can contribute to continuous increase in soil P content. The Northern Basin of Lake Pontchartrain has a diverse livestock and poultry industry, among which small dairies have been a traditional component of the economy. The outreach component of this project is to demonstrate to local farmers the viability of feeding recommended P levels in dairy diets. The scientific objective of this study is to evaluate the effect of Ca and P use by transition cows with the intent to increase feed phosphorus utilization efficiency and to minimize mineral output in the excreta.

Materials and Methods

A basal diet was estimated to contain 15 % below NRC (2001) mineral "total absorbed requirement" (**TAR**). Supplemental mineral was provided to achieve 20 % above TAR, in a factorial design. Treatments were higher Ca – higher P (0.72 % HCa : 0.48 % HP, diet DM), higher Ca – lower P (0.72% HCa : 0.36 % LP, diet DM), lower Ca – higher P (0.53 % LCa : 0.48 % HP, diet DM), and lower Ca – lower P (0.53 % LCa : 0.36 % LP, diet DM). Feeds included in the diets are commonly available in the Southeast US (alfalfa hay, bermuda grass hay, corn silage, shelled corn, mineral mix, and salt). Dietary mineral concentrations were adjusted with calcium carbonate and monosodium phosphate. Statistical analyses were performed using Proc Mixed (SAS, version 9.1). Milk yield and dry matter intake used milk production of the previous lactation as covariate.

Preliminary Results:

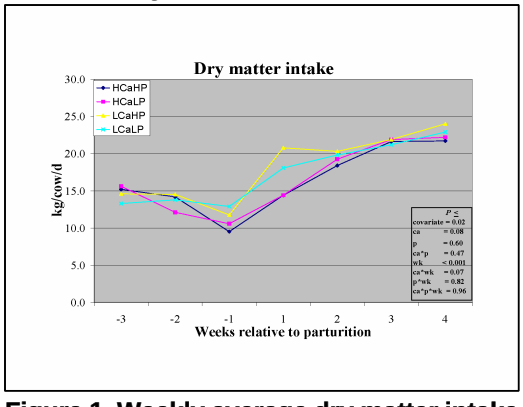

Figure 1. Weekly average dry matter intake relative to parturition.

Twenty-four cows of the intended 48 transition dairy cows have completed the feeding trial. Cows tended to recover intake faster with low calcium diets (Ca vs. week, *P* = 0.07). Despite diet HCa:LP resulted in 2.3 kg to 3.0 kg higher milk yield than other treatments, statistical analyses was not significant. Also, higher mineral content in the diets appeared to have an effect on dry matter digestibility, but it was not significant thus far. Changes in body condition score and body weight, and milk composition (fat, protein and lactose) were similar for all treatments. A preliminary evaluation of the data suggests that feeding Ca and P below NRC (2001) recommended levels did not limit animal performance during the first 30 days in milk.

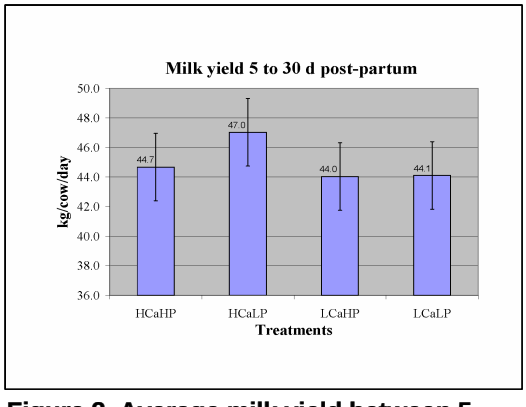

Figure 2. Average milk yield between 5 and 30 days post-partum.

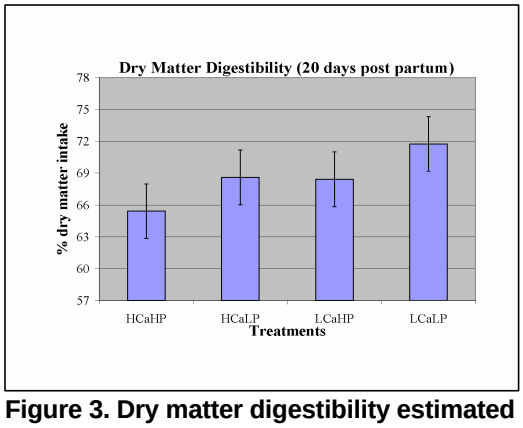

Figure 3. Dry matter digestibility estimated with cows averaging 20 days in milk.

Implications:

The practical application of this project can benefit both, farmers and environment. Nearly half a million dollars per year can be saved from lower feed costs as farmers can feel confident to decrease P supplementation for dairy cows in Louisiana from 0.48 % P to levels within NRC (2001) recommendation (around 0.40 % P). That represents $1,600 for an average Louisiana dairy farm (120 cows). Moreover, as much as 230 tons of P can be voided from manure of dairy cows, thus decreasing the risk of P enrichment of Louisiana soils and public waters.

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