



# Inclusion of Alfalfa Hay in Diets for Non-lactating Dairy Cows During the Prepartum Period

Ahmerah Thompson, Gonzalo Ferreira, Virginia Tech

## RATIONALE & OBJECTIVES

- Dairy cows transitioning from a dry stage to a lactating stage after calving have a great risk of suffering hypocalcemia.
- Feeding prepartum diets with a negative dietary cation-anion difference (DCAD) to dry cows is a frequent practice to reduce the risk of hypocalcemia in the postpartum.
- The high concentration of K in alfalfa can challenge the possibility of obtaining a negative DCAD. Therefore, alfalfa may be less desirable to be included in diets for dry cows in the prepartum period.

### Objectives:

To determine the urine pH, Ca concentration in blood, and incidence of hypocalcemia from dry cows consuming diets containing either grass hay (GH) or alfalfa hay (AH) with the inclusion of either calcium chloride (CL) or polyhalite mineral (PO) during the prepartum period.

## STUDY DESCRIPTION

- Eighty dry Holstein cows were fed 1 of the 4 experimental diets during the prepartum period.
- Diets included a combination of grass hay (GH) or alfalfa hay (AH) and calcium chloride (CL) or polyhalite (PO) as acidogenic product.

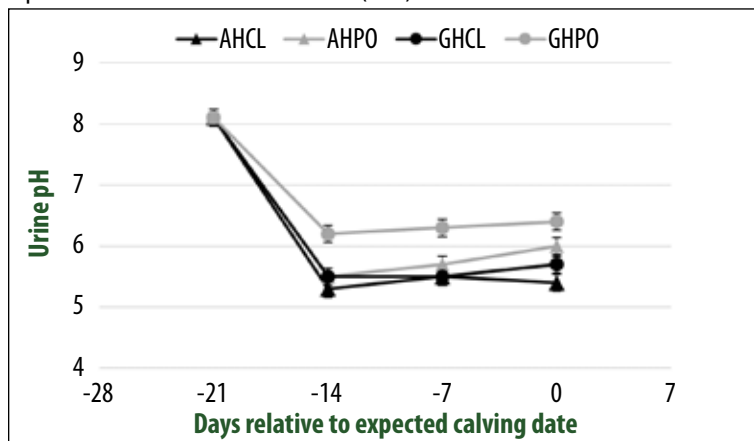
## RESULTS

- GH contained 7.5% CP and 74.9% NDF, whereas the AH contained 19.6% CP and 45.6% NDF.
- GH contained 0.36% Ca, 0.09% Na, 1.88% K, 0.38% Cl, and 0.15% S, whereas AH contained 1.52% Ca, 0.16% Na, 2.5% K, 0.77% Cl, and 0.32% S.
- GH had a cation-anion difference equal to 289 mEq/kg DM, whereas AH had a cation-anion difference equal to 292 mEq/kg DM.



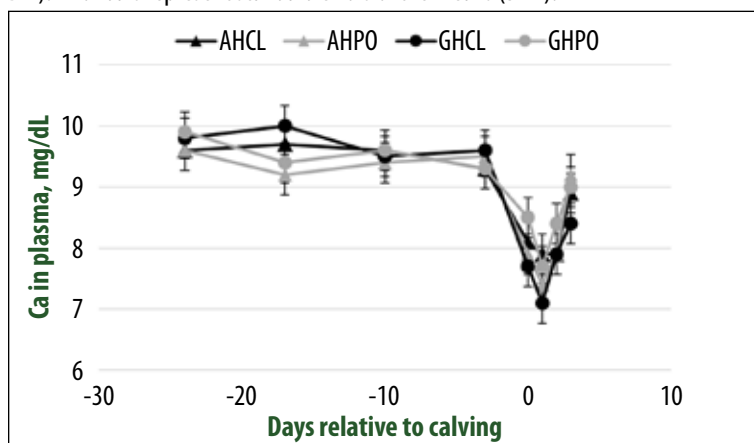
- Feeding the diets with a negative DCAD decreased urine pH, and this occurred for all four diets. Urine pH decreased to a lesser extent for the cows consuming the GHPO diet than for the rest of the cows (Figure 1).

**Figure 1.** Urinary pH of pregnant and non-lactating dairy cows during the prepartum period. Cows consumed diets containing grass hay and calcium chloride as an acidogenic product (GHCL; DCAD = -209 mEq/kg DM), grass hay and polyhalite as an acidogenic product (GHPO; DCAD = -207 mEq/kg DM), alfalfa hay and calcium chloride as an acidogenic product (AHCL; DCAD = -190 mEq/kg DM), or alfalfa hay and polyhalite as an acidogenic product (AHPO; DCAD = -194 mEq/kg DM). Error bars represent standard errors of the means (SEM).



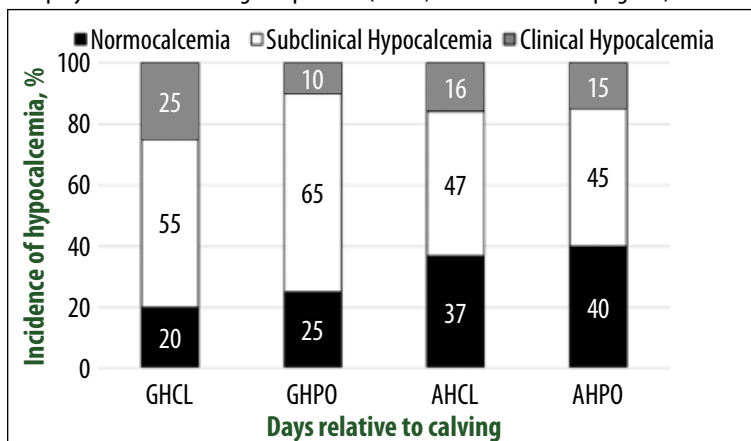
- The concentration of Ca in plasma decreased substantially around calving but neither the hay type nor the acidogenic product affected it. No interaction existed between these factors or between time and any of these factors (Figure 2).

**Figure 2.** Concentration of Ca in plasma from pregnant and non-lactating dairy cows during the prepartum period. Cows consumed diets containing grass hay and calcium chloride as an acidogenic product (GHCL; DCAD = -209 mEq/kg DM), grass hay and polyhalite as an acidogenic product (GHPO; DCAD = -207 mEq/kg DM), alfalfa hay and calcium chloride as an acidogenic product (AHCL; DCAD = -190 mEq/kg DM), or alfalfa hay and polyhalite as an acidogenic product (AHPO; DCAD = -194 mEq/kg DM). Error bars represent standard errors of the means (SEM).



- Cows consuming diets containing AH had a greater incidence of normocalcemia than cows consuming diets containing GH (Figure 3).

**Figure 3.** Incidence of normocalcemia ([Ca] > 8.0 mg/dL during the first 4 days after calving), subclinical hypocalcemia (5.5 < [Ca] < 8.0 mg/dL at least once in the first 4 days after calving), and clinical hypocalcemia ([Ca] < 5.5 mg/dL at least once in the first 4 days after calving) in pregnant and non-lactating dairy cows during the prepartum period. Cows consumed diets containing grass hay and calcium chloride as an acidogenic product (GHCL; DCAD = -209 mEq/kg DM), grass hay and polyhalite as an acidogenic product (GHPO; DCAD = -207 mEq/kg DM), alfalfa hay and calcium chloride as an acidogenic product (AHCL; DCAD = -190 mEq/kg DM), or alfalfa hay and polyhalite as an acidogenic product (AHPO; DCAD = -194 mEq/kg DM).



## IMPLICATIONS

- The inclusion of alfalfa hay in prepartum diets for dry cows does not necessarily increase the incidence of hypocalcemia relative to prepartum diets including grass hay.
- The cation-anion difference of the alfalfa hay is a determinant of whether alfalfa hay fits in a prepartum feeding program for pregnant and non-lactating cows.
- More research evaluating the fertility of the soil and the use of acidifying fertilizers is needed to better understand how to incorporate alfalfa hay in prepartum diets for dry cows in the prepartum period.