

# Transient vs persistent subclinical hypocalcemia: Association of calcium status with early lactation disease and production in Holstein cows

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## Introduction

Decreased blood calcium (Ca) concentration in the early postpartum period, often diagnosed as subclinical hypocalcemia (SCH), is a common occurrence in Holstein cows. Our objectives were to evaluate the association of SCH duration with the risk of early lactation negative events and milk production.

## Materials and Methods

Data from a cohort of 407 Holstein cows in 2 herds in NY were used. Primiparous and multiparous cows were classified into 1 of 4 groups based on postpartum plasma total Ca (tCa) at certain days in milk (DIM): normocalcemic (NC; primiparous tCa concentration  $>2.15$  mmol/L at 1 and 2 DIM,  $n=67$ ; multiparous tCa concentration  $>1.77$  at 1 DIM,  $>2.20$  mmol/L at 4 DIM,  $n=109$ ); transient SCH (tSCH; primiparous tCa concentration  $\leq 2.15$  at 1 DIM,  $>2.15$  mmol/L at 2 DIM,  $n=25$ ; multiparous tCa concentration  $\leq 1.77$  at 1 DIM,  $>2.20$  mmol/L at 4 DIM,  $n=50$ ); persistent SCH (pSCH; primiparous tCa concentration  $\leq 2.15$  mmol/L at 1 and 2 DIM,  $n=33$ ; multiparous tCa concentration  $\leq 1.77$  at 1 DIM,  $\leq 2.20$  mmol/L at 4 DIM,  $n=34$ ); or delayed SCH (dSCH; primiparous tCa concentration  $>2.15$  at 1 DIM,  $\leq 2.15$  mmol/L at 2 DIM,  $n=19$ ; multiparous tCa concentration  $>1.77$  at 1 DIM,  $\leq 2.20$  mmol/L at 4 DIM,  $n=70$ ). Evaluated outcomes were development of a negative event (NEG; hyperketonemia at 3, 5, 7, and/or 10 DIM, metritis, or displaced abomasum or herd removal within 60 DIM) and average milk yield per day across the first 10 weeks of lactation. Multivariable Poisson models were used to analyze the NEG outcome and generalized linear mixed models for milk yield.

## Results

Both primiparous and multiparous cows with tSCH were no more likely to have a NEG event than NC cows (primiparous risk ratio (RR) = 1.3, 95% CI = 0.5 to 3.2; multiparous RR = 1.4, 95% CI = 1.0 to 2.1). However, primiparous and multiparous pSCH cows were 4.1 (95% CI = 2.1 to 7.9) and 1.8 (95% CI = 1.2 to 2.7), and dSCH cows 3.2 (95% CI = 1.5 to 7.0) and 1.8 (95% CI = 1.4 to 2.6) times more likely to have a NEG event than NC cows, respectively. Both primiparous and multiparous cows with tSCH produced more milk per day than NC, pSCH, or dSCH cows across the first 10 weeks of lactation. Primiparous cows averaged  $62.7 \pm 1.5$ ,  $70.2 \pm 2.4$ ,  $65.3 \pm 2.0$ , and  $63.1 \pm 2.6$  lb ( $28.5 \pm 0.7$ ,  $31.9 \pm 1.1$ ,  $29.7 \pm 0.9$ , and  $28.7 \pm 1.2$  kg) per day for NC, tSCH, pSCH, and dSCH cows, respectively, and multiparous cows averaged  $98.1 \pm 1.5$ ,  $108 \pm 2.4$ ,  $102 \pm 2.8$ , and  $91 \pm 2$  lb ( $44.6 \pm 0.7$ ,  $49.1 \pm 1.1$ ,  $46.4 \pm 1.3$ , and  $41.4 \pm 0.9$  kg) per day for NC, tSCH, pSCH, and dSCH, respectively.

## Significance

Our results suggest that cows with tSCH adapt better to early lactation, develop fewer NEG events, and produce more milk than NC, pSCH, or dSCH cows. Primiparous or multiparous cows with pSCH or dSCH are at an increased risk for early lactation negative events and reduced milk production.