

# Texas Dairy Matters

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## **Calcium bolus supplementation to dairy cows after calving**

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### **Introduction**

Giving oral calcium supplements to cows after calving is a practice adopted by many dairy farms. However, its value remains uncertain. Statistical analyses from eight studies, a meta-analysis, suggests that a blanket treatment approach for all postpartum cows would not result in increased milk production or enhanced reproductive performance<sup>1</sup>. Furthermore, limited scientific evidence suggests that, at most, a subpopulation of postpartum cows might benefit from prophylactic oral calcium supplementation<sup>2,3</sup>. This article will review the classification and preventive strategies of subclinical hypocalcemia in dairy cows.

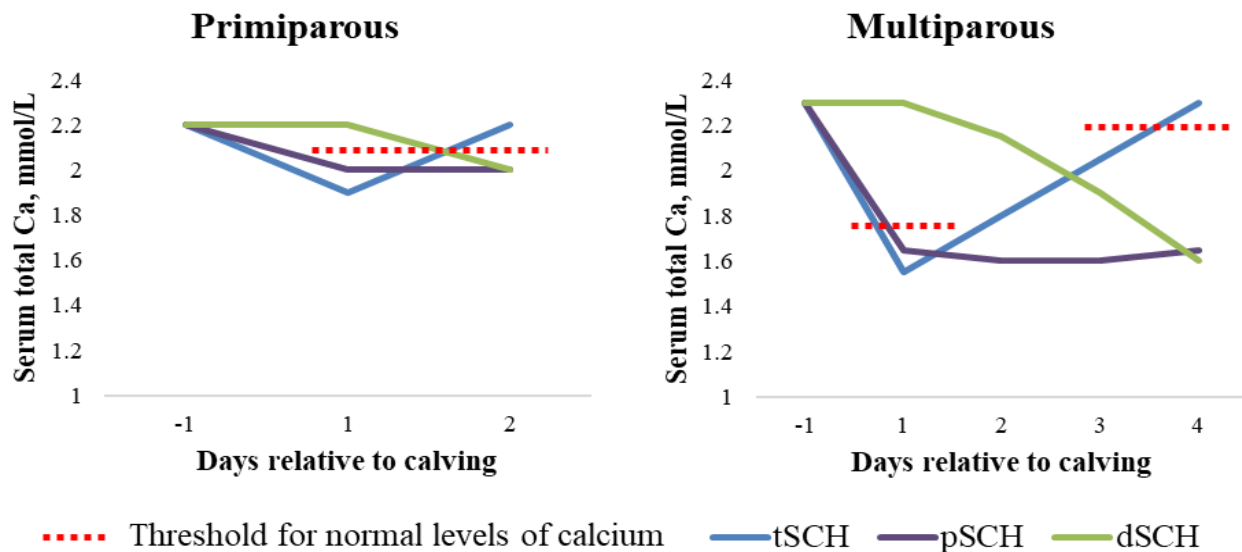
### **Definition and classification of hypocalcemia**

Compared to a couple weeks prior to calving, calcium requirements of cows increase more than threefold and feed intake decreases by 30% after calving<sup>4,5</sup>. Consequently, there is a negative calcium balance due to a lower consumption and increased secretion of calcium by mammary glands resulting in reduced blood calcium concentration. The severity and persistency of this decline in blood calcium concentration will determine if cows develop clinical or subclinical hypocalcemia. Clinical hypocalcemia is a metabolic disease characterized by severe low blood serum calcium concentration (<5.5 mg/dL), tetany, recumbence and, if untreated, death<sup>6</sup>. Subclinical hypocalcemia (SCH) is characterized by low blood serum calcium (between 5.5 to 8 mg/dL) concentration without the presence of clinical signs<sup>7</sup>.

### **Transient SCH is not detrimental to cow performance**

Subclinical hypocalcemia could be further classified as transient, persistent and delayed<sup>8</sup>. Transient SCH occurs when blood calcium concentration drops below its normal level on the first day of lactation and recovers to its normal level two to four days after calving. Transient

SCH doesn't impair health and is correlated with increased milk production compared to cows that don't have SCH<sup>9</sup>. Persistent SCH occurs when blood calcium concentration drops on the first day after calving and remains below normal levels at two and four days in milk, for cows on their first and second or greater lactations, respectively. Delayed SCH is when cows have normal blood calcium concentration on the first day after calving but below normal two or four days after calving for cows on their first and second or greater lactations, respectively. Compared to transient SCH, persistent and delayed SCH are associated with increased risks of developing diseases and leaving the herd early in lactation, and reduced milk production and reproductive performance<sup>8-10</sup>.



**Figure 1.** Scheme exemplifying the changes in serum total calcium concentration that differentiate types of subclinical hypocalcemia (SCH) in cows on their first (primiparous) and second or greater lactations (multiparous). tSCH: Transient SCH; pSCH: Persistent SCH; dSCH: Delayed SCH. Adapted from McArt and Neves 2020.

### Preventive strategies

Clinical hypocalcemia has been successfully controlled with pre-partum feeding strategies such as supplementation with anionic salts or the use of mineral binders<sup>11,12</sup>. However, a successful strategy to prevent SCH and the overall value remain unclear. One strategy is to supplement calcium through bolus administration after calving. Calcium is added to boluses in the form of salts. Calcium chloride (CaCl<sub>2</sub>) and calcium sulfate (CaSO<sub>4</sub>) are the most common ones and are proven to increase calcium blood concentration within an hour after supplementation. However, 48 hours after supplementation, calcium levels do not differ from cows that were not supplemented<sup>1</sup>. In the rumen, the salts are dissolved into calcium and chloride or sulfate. Thus, through bolus administration, we are also supplementing acidogenic ions and acidifying the blood<sup>13</sup>. Potentially, this can be why only a group of animals benefits from calcium bolus supplementation at calving. Thus, it's essential to identify and supplement only cows that would benefit.

Limited evidence suggests that lame cows may benefit from oral calcium bolus supplementation<sup>14</sup>. Finding lame cows is not difficult and is routine in dairy operations. Another group that might benefit are animals at risk of experiencing delayed or persistent subclinical hypocalcemia<sup>15</sup>. Nevertheless, identifying animals at greater risk of having SCH is much more difficult and currently impractical. The use of activity monitors might help find cows at risk of SCH but warrants further investigation<sup>16</sup>.

## Conclusion

Overall, blanket calcium supplementation through administration of a bolus to cows after calving does not improve milk yield or herd health. Limited evidence indicates that targeted treatment of calcium bolus supplementation to some cows, such as lame cows or cows at greater risk for persistent or delayed subclinical hypocalcemia, might be beneficial. Nevertheless, managing to treat only a specific group of cows is challenging in a commercial setting, and the value of this target-group treatment approach warrants further investigation.

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