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## *Calf Note #254 – Maternal hypocalcemia and FPT in calves*

### **Introduction**

There is an increasing body of evidence that shows that prenatal events can affect the calf in a multitude of ways. For example, researchers from the University of Florida (Tao et al., 2012; Montiero et al., 2014; Ahmed et al., 2021) reported that late gestation heat stress in Holstein cows reduced absorption of IgG and predisposed calves to greater risk of morbidity and mortality. Other examples of prenatal stress on physiological responses have also been reviewed recently (Abuelo, 2020).

An interesting manuscript published in the Veterinary Journal evaluated the calcium status of multiparous Holstein cows and the effects of transient or persistent hypocalcemia on the absorption of IgG in their calves.

### **The Research**

One hundred multiparous cows were evaluated for calcium status and hypocalcemia (**SCH**) at 1 and 4 days after calving. Cows were categorized into 1 of 4 groups based on their serum Ca concentrations: normal (**CON**; Ca >1.87 at 1 day in milk (**DIM**) and >2.10 mmol/L at 4 DIM, n = 36), transient SCH (**TSCH**; Ca ≤1.87 at 1 DIM and >2.10 mmol/L at 4 DIM, n = 14), persistent SCH (**PSCH**; Ca ≤1.87 at 1 DIM and ≤2.10 mmol/L at 4 DIM, n = 15), or delayed SCH (**DSCH**; Ca >1.87 at 1 DIM and ≤2.10 mmol/L at 4 DIM, n = 35).

To “make sense” of the treatments – transient means low blood Ca right after calving, but with normal blood Ca by 4 days postpartum; persistent means low blood Ca at 4 days postpartum, and delayed means OK at birth, but low blood Ca after 4 days.

Close-up cows were fed a TMR containing 34% corn silage, 10% alfalfa hay, 3% wheat straw, 19% barley grain, 9% corn, 5% soybean meal, 5% canola meal and other minor components. The DCAD value was -55 meq/kg, and the diet contained 1.29 and 0.48 Ca and P, respectively.

Calves were separated from their dams at birth and moved to individual stalls and kept individually until weaning. All calves received 4 L of pasteurized colostrum (>50 mg of IgG/dL), not from their dams, within 2 after birth. After that, calves were fed 5 L pasteurized milk twice a day. Fresh water and starter were available to the calves from 3 d of age until weaning.

### **The Results**

Calcium status had no effect on the amount of colostrum produced by cows in the first milking after calving (3.5 kg). Nor was colostrum quality affected (average BRIX = 28%) or birth BW (39 kg).

However, the proportion of calves with FPT (defined as serum total protein <5.5 g/dl collected 48 h after birth) – was significantly higher in calves from PSCH mothers ( $P < 0.03$ ) and tended to be higher in calves from DSCH mothers ( $P < 0.10$ ) as shown in Figure 1.

Also, the researchers monitored daily fecal scores and recorded the proportion of calves that developed diarrhea during the first 10 days of age. Calves from PSCH and DSCH tended ( $P < 0.10$ ) to have greater incidence of diarrhea compared to normal cows or cows that experienced only transient hypocalcemia. Their

data suggest that calcium status of the dam - especially, if hypocalcemia persists beyond the first day after calving - can influence IgG absorption by calves, thereby making the calves more susceptible to diarrhea.

To put things in perspective, data from Wilhelm et al. (2017) did not report increased incidence of FPT in calves from hypocalcemic cows (both groups had incidence of FPT <3%) though calves from hypocalcemic cows were more likely to have diarrhea within the first 10 d of life (49% vs 33% for normal cows). This suggests that the predisposition to diarrhea in calves from hypocalcemic cows might be associated with some change in intestinal structure or function that makes the animal more susceptible to diarrhea. However, the percentage of calves with FPT may also be affected by IgG intake as well as age at first feeding and other factors, which were not reported in either study.

## Summary

Increasing evidence shows that “what we do to Mom, we do to baby” and proper calf management needs to begin prior to birth. Maternal problems such as hypocalcemia can affect the newborn, so proper dry cow management is critical to excellent calf performance.

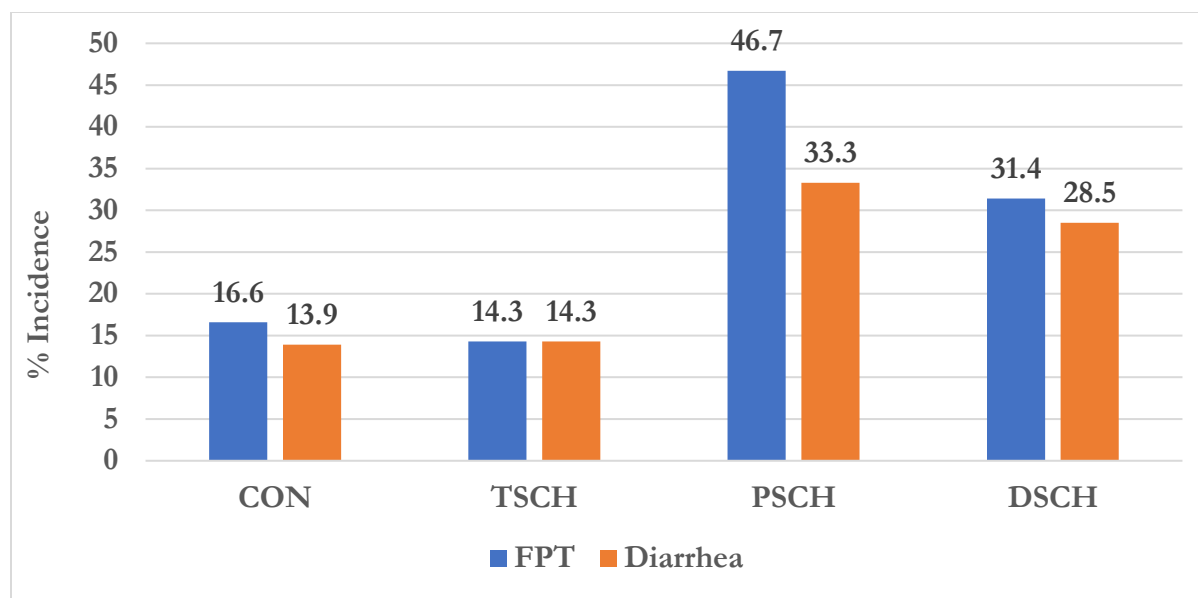


Figure 1. Incidence of FPT and diarrhea in calves from cows with varying Ca status. From: Sobrabi et al., 2024.

## References

- Abuelo, A. 2020. Symposium review: Late-gestation maternal factors affecting the health and development of dairy calves. *J. Dairy Sci.* 103:3882-3893. <https://doi.org/10.3168/jds.2019-17278>.
- Ahmed, B.M.S., U. Younas, T. O. Asar, A.P.A. Monteiro, M.J. Hayden, S. Tao, and G. E. Dahl. 2021. Maternal heat stress reduces body and organ growth in calves: Relationship to immune status. *JDS Commun.* 2:295–299. <https://doi.org/10.3168/jdsc.2021-0098>.
- Monteiro, A.P.A., S. Tao, I. M. Thompson, and G. E. Dahl. 2014. Effect of heat stress during late gestation on immune function and growth performance of calves: Isolation of altered colostrum and calf factors. *J. Dairy Sci.* 97: 6426-6439. <https://doi.org/10.3168/jds.2013-7891>.
- Sobrabi, H. R., T. A. Farahani, S. Karimi-Dehkordi, and N. E. Farsuni. 2024. Association of different classifications of hypocalcemia with quantity and quality of colostrum, milk production, and health of Holstein dams and their calves. *Vet. J.* 307:106205. <https://doi.org/10.1016/j.tvjl.2024.106205>.

Tao S., A.P.A. Monteiro, I. M. Thompson, M. J. Hayen., and G. E. Dahl. 2012. Effect of late-gestation maternal heat stress on growth and immune function of dairy calves. *J. Dairy Sci.* 95:7128–7136. <https://doi.org/10.3168/jds.2012-5697>.

Wilhelm, A .L, M. G. Maquivar, S. Bas, T. A. Brick, W. P. Weiss, H. Bothe, J. S. Velez, and G. M. Schuenemann. 2017. Effect of serum calcium status at calving on survival, health, and performance of postpartum Holstein cows and calves under certified organic management. *J. Dairy Sci.* 100:3059-3067. <https://doi.org/10.3168/jds.2016-11743>.

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