

Post Estrus Hypocalcemia in a Repeat Breeder Half-Breed Holstein Cow

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Abstract: Post estrus hypocalcemia is a very rare and exclusive syndrome in the dairy cows that occurs after ending the estrus signs. The aim of this study was introducing the estrus as a rare cause of hypocalcemia in the cow. On the September 2005, an adult half-breed Holstein cow, with symptoms of recumbency, hypothermia and depression was referred to veterinary clinic of the Tabriz University. According to the owner, this case had vigorous estrus signs, the day before the examination and had a history of repeat breeding. After general examination and blood sampling from the jugular vein, post estrus hypocalcemia was confirmed (total serum calcium $<5 \text{ mg dL}^{-1}$). For treatment, 1 L of calcium borogluconate 40% solution was administered intravenously to the cow. After infusion of calcium solution, cow stood up and recovered her health.

Key words: Recumbency, hypocalcemia, post estrus, repeat breeder

INTRODUCTION

Hypocalcemia is a metabolic disease occurring most commonly about the time of parturition in adult females and is characterized by inability to standing up, general muscular weakness, circulatory collapse and depression of consciousness (Radostits *et al.*, 2007). Hypocalcemia develops as a result of the sudden drain of calcium to colostrum at the onset of lactation, resulting in a tremendous challenge to the cow's ability to maintain normal calcium levels in blood. Milk fever is the clinical manifestation of hypocalcemia and the decreased plasma calcium content is accentuated in affected cows. Affected cows are recumbent and are unable to rise and have a calcium deficit of 8 grams (Risco, 2004). Normal blood calcium is $8-12 \text{ mg dL}^{-1}$, when blood calcium is reduced to $4-5 \text{ mg dL}^{-1}$, the signs of hypocalcemia are appeared (Goff *et al.*, 2005). It is generally conceded that a depression of the levels of ionized calcium in tissue fluids is the basic biochemical defect in parturient paresis and affected cows respond rapidly to the potential administration of calcium solutions. At the time of hypocalcemia both total and ionized serum calcium levels fall proportionately. Individual cows and to some extent families of cows, are more susceptible than others, the disease tending to recur at successive parturitions. The heritability of susceptibility to milk fever and hypocalcemia has been assessed as significant (Radostits *et al.*, 2007). Hypocalcemia has been reported in the heifers and sheep (Cockcroft and Whiteley, 1999) and similar disease has been explained in the mares as lactation tetany because of its more frequent occurrence during lactation and after transport (Radostits *et al.*,

2007). Also hypocalcemia have a negative effect on the placental expulsion in the mare (Sevinga *et al.*, 2002). Hypocalcemia has been documented for cows with coliform mastitis and the odds of hypocalcemia increase as the severity of clinical signs increases (Morin, 2004). One of the more unusual causes is hypocalcemia associated with estrus. These cows are cold to the touch (especially the ears; feeling the ears for temperature is a very useful part of the physical examination of dairy cattle), sometimes weak (although rarely unable to rise as in classic milk fever) and some have bloated rumens.

The aim of this study was introducing the estrus as a rare cause of hypocalcemia in the cow.

MATERIALS AND METHODS

On the September 2005, an adult half-breed Holstein cow, with symptoms of sternal recumbency, depression, hypothermia and inability to standing up, was referred to veterinary clinic of the Tabriz University (Fig. 1). According to the herdsman, she was in heat the day before referring to the clinic and frequently, mounting the other cows. She had a history of 5 successful pregnancy and parturition without any problem or disease and her last parturition was the 6 month ago. Since 4 month ago, she has been shown the estrus signs every 21 days and in spite of frequently insemination, however she had not been conceived yet. Therefore, she was a repeat breeder cow and on examination she had a good body condition score ($\text{BCS} > 3$), but did not have a history of hypocalcemia in the previous parturitions (Fig. 2). My first thought was possible fractures in her legs or pelvic hones, but careful examination revealed that this cow had



Fig 1: Post estrus hypocalcemia in a Half-Breed holstein cow



Fig 3: Bottles of calcium borogluconate 40% solution



Fig. 2: The same cow with sever depression



Fig. 4: Restraining cow for intravenous infusion of calcium borogluconate

gone through a period of non-parturient hypocalcemia. The rectal temperature was 36°C and the body extremities were very cold. Circulatory signs were prominent including a marked decrease in the intensity of the heart sounds and an increase in heart rates (about 90 min^{-1}). The respiration of the cow was abnormal and hyperpnea with soundly expirations was prominent. Finally for diagnosis of the disease, a blood sample was taken from the jugular vein and sent to diagnostic laboratory for analysis.

RESULTS

Blood analysis by laboratory indicated a low level of total serum calcium concentration (below of 5 mg dL^{-1}). Serum levels of magnesium and inorganic phosphorus were 4.5 and 2 mg dL^{-1} , respectively. Changes in the leukocyte count included the neutrophilia and lymphopenia. According to the blood analysis and very low level of total serum calcium concentration post estrus hypocalcemia was confirmed.



Fig. 5: Intravenous infusion of calcium borogluconate to the cow



Fig. 6: The same cow after treatment

For treatment, one liter of calcium borogluconate 40% solution (4 bottles of 250 mL calcium borogluconate 40% produced by Nasr Pharmacy) (Fig. 3) after warming in the water bath, was administered by route of slow intravenous infusion (Fig. 4). During the calcium borogluconate infusion signs of recovery including muscular tremor and urination were observed (Fig. 5). After ending the calcium infusion cow stood up and walked away (Fig. 6). For diagnosis of the causal factor of repeat breeding problem in this case, rectal palpation was done a day after calcium infusion and chronic endometritis was confirmed. For treatment 50 mL oxytetracyclin 5% was infused into uterine horns. At the next estrus cow was inseminated and conceived successfully.

DISCUSSION

Hypocalcemia in the dairy cows is a fairly common problem, which is estimated to occur at the rate of 5-10% nation wide (Horst, 1986). It is caused by a depletion of calcium reserves caused by the development of a negative calcium balance in late pregnancy or in other times including *E.coli* mastitis, parturition and intravenous injection of aminoglycoside antibiotics (Morin, 2004). During the periparturient period the demands for calcium are increased; these increased demands for calcium can result in subclinical or clinical hypocalcemia. Periparturient cows also experiences significant immune suppression (Kimura *et al.*, 2006). Post estrus hypocalcemia is a very rare and exclusive syndrome in the dairy cows that occurs after ending the estrus signs. The exact reasons of this syndrome have not been identified in the cow, but probable reasons according to the above mentioned subjects could be immune suppression caused by stress and excitement

which in turn lead to depletion of intracellular calcium stores of immune cells (Kimura *et al.*, 2006). On other hand, depression of appetite by the elevation of blood estrogen levels may precipitate hypocalcemia attacks during the period of estrus. Also, rising in estrogen levels at the time of estrus may be interfering with calcium mobilization from bones (Vagg *et al.*, 1981). Occasionally there is no history of estrus or breeding but when a reproductive examination is done as part of the physical exam, there are the tell-tale signs of estrus: uterine tone; a follicle or the corpus hemorrhagicum where a follicle had been and sometimes clear mucous from the reproductive tract. In sever cases of non-parturient hypocalcemia intravenous calcium borogluconate infusion, as in the case above, might be needed. Body condition score of our case was very good and the presence of excessive fat stores in the body may be a risk factor for the hypocalcemia attacks in the cow.

CONCLUSION

In conclusion the excessive obesity, high levels of blood estrogen and excitement at the estrus periods, may be the 3 important factors for occurring the post estrus hypocalcemia in the cows.

REFERENCES

- Cockcroft, P.D. and P. Whiteley, 1999. Hypocalcemia in 23 ataxic/recumbent ewes: clinical signs and likelihood ratios. *Vet. Rec.*, 144: 529-532. veterinaryrecord.bvpublications.com/content/vol144/issue19/index.dtl.
- Goff, J.P., J.M. Sanchez and R.L. Horst, 2005. Hypocalcemia: Biological effects and strategies for prevention. Nutrition Conference, University of Tennessee, Department of Animal Science, UT Extension and University Professional and Personal Development. pp: 6. www.tennesseenutritionconference.org/pdf/Proceedings2005/JeffGoff.pdf. www.cipav.org/co/lrrd/lrrd20/4/corra20059.htm-427k.
- Horst, R.L., 1986. Regulation of calcium and phosphorus homeostasis in dairy cows. *J. Dairy Sci.*, 69 (2): 604-616. jds.fass.org/cgi/content/abstract/69/2/604?ck=nck.
- Kimura, K., T.A. Reinhardt and J.P. Goff, 2006. Parturition and hypocalcemia blunts calcium signals in immune cells of dairy cattle. *J. Dairy Sci.*, 89 (7): 2588-2595. www.ucm.es/BUCEM/compludoc/W/10606/00220302_1.htm - 42k.

- Morin, D.E., 2004. Beyond antibiotics-what else can we do? NMC Annual Meeting Proceedings, pp: 13-23. www.nmconline.org/articles/antib.pdf.
- Radostits, O.M., C.C. Gay, K.W. Hinchcliff and P.D. Constable, 2007. *Veterinary Medicine*. 10th Edn. Published by Saunders Company, ISBN: 10:70 20 2777 4 printed in Spain, pp: 80-81.
- Risco, C.A., 2004. Managing the Postpartum Cow to Maximize Pregnancy Rates. Proceedings 2004 Florida Dairy Reproduction Road Show, pp: 10-23. dairy.ifas.ufl.edu/files/drs/2004/Postpartum.pdf.
- Sevinga, M., H.W. Barkema and J.W. Hesselink, 2002. Serum calcium and magnesium concentrations and the use of a calcium-magnesium borogluconate solution in the treatment of Frisian mares with retained placenta. *Theriogenology*, 57 (2): 941-947, 11991396 (P, S, E, B).
- Vagg, M.J., W.M. Allen, D.C. Davies, B.F. Sansom, H.J. Edwards, J.M. Pott and C.J. Riley, 1981. Field trial to determine the efficacy of 2 doses of 1 alpha-hydroxycholecalciferol in the prevention of milk fever. *Vet. Rec.*, 109 (13): 273-275.