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WENSUM VALLEY VETS

A GUIDE TO PREVENTING SUBCLINICAL HYPOCALCAEMIA THROUGH DIET MANIPULATION

Subclinical Hypocalcaemia in Cattle (*Milk Fever*)

Farmers are usually very good at detecting and dealing with cows experiencing clinical symptoms due to low blood calcium levels (clinical hypocalcaemia), most often at the onset of lactation, after calving.

Subclinical hypocalcaemia however – defined by a blood calcium concentration between 1.4mmol/L – 2.1mmol/L – can be much more difficult to detect, usually only identified when the farmer sees an increase in disease post calving.

How Does It Occur?

Post calving, a lactating cow's energy demand increases significantly, alongside their daily requirement for calcium. This increased demand occurs simultaneously with a 30% decrease in feed intake around calving, therefore restricting their intake of dietary calcium.

The cow therefore must increasingly rely upon calcium stores within the body – namely within the skeleton due to decreased uptake via the gut. Hormonal regulation of calcium mobilisation from the bones can take a few days to kick in leaving a risk period immediately post calving.

How Can It Be Prevented?

Prevention can be brought about in many ways, but we must first consider what is practical, and that differs farm to farm. Some options include:

- **Feeding a negative DCAD Diet** (dietary cation anion difference) in the close-up period:
    - Proven to reduce incidence of subclinical hypocalcaemia from 50% to 30%
    - Involves feeding a diet weighted more towards negatively charged chloride and sulphide ions compared to positively charged potassium and sodium ions, promoting metabolic acidosis which significantly reduces urine PH whilst only slightly decreasing blood PH.
        - Reduced urine PH allows excretion of Ca out urine into the blood
        - Slightly reduced blood PH improves the response of target tissues to hormones that cause calcium release from bones and vitamin D activation in the kidney. (Vitamin D improves calcium absorption in the gut).
- **Partial and Fully Acidogenic Diets**:
    - Aims to reduce urine PH below neutral (PH7).
    - A partial diet should put the urine PH between 6-7 – this is effective at reducing clinical hypoCa and may help reduce subclinical hypoCa too.

  - A fully acidogenic diet maintains urine PH between 5.5-6. This can significantly reduce hypoCa by increasing Ca absorption from the urine due to significant reduction in urine PH. This provides maximum benefits in fresh cow performance, increasing uptake and milk production.

When introducing a negative DCAD diet on farm partially acidogenic diets are better than no-DCAD diets. They have been the more practical choice as chloride and sulphide ions can cause feed to be less palatable, therefore decreasing intake.

Response to fully acidogenic diets can be enhanced by feeding extra calcium as this may increase absorption in the gut. Also ensure mineral requirements are being met.

Other Strategies:

- **Low Calcium Diet During Close Up Period Diet**:
  - Restricting calcium in the diet pre-calving has been proven to reduce clinical hypocalcaemia however this can be hard to achieve as most available feeds (protein, forages and grains) all contribute to Calcium in the diet.
- **Vitamin D Supplementation in Close Up Period**:
  - Research has shown this to be effective in preventing milk fever only if injections are given between day 1 and 4 prior to due date at very high levels. If she calves outside this period, more injections cannot be given due to concerns around toxicity.
  - No effective treatments for preventing subclinical hypocalcaemia have been demonstrated yet.
- **Calcium Boluses and Supplementation Post-Calving**:
  - Oral Calcium boluses can be used for high risk cows- these contain differing amounts of rapidly and slowly absorbed calcium.
    - Rapidly absorbed Calcium salts - acidifying and bioavailable but can be irritating to the oral mucus membranes.
    - Slowly absorbed Calcium salts have either equal efficacy and longer duration of action (Calcium propionate) or are ineffective as an immediate Calcium source due to poor bioavailability (Calcium sulphate, calcium carbonate).
    - The duration of blood calcium increase varies from 1-24hrs post administration. Most suited to older/higher yielding cows.
  - Not all are the same so ensure you read up on their composition for best results.
- **Feeding Calcium Binders in the Close Up Period**
  - Calcium present in feed can make it hard to restrict levels in the diet enough to aid absorption from body stores when demand is high. We can try restricting Ca available by using a binding agent. Synthetic sodium aluminium silicate can be used to bind calcium, phosphate and magnesium in the rumen. Consider cost and correct diet formulation before considering this.
    - Also potential side effects of hypophosphatemia and hypomagnesaemia.

Conclusion:

- Identify at risk cows. Multi-parous, high-yielding cows and cows with low dry matter intakes (e.g. lame) will benefit from additional calcium supplementation post calving.
- **An effective and proven means of reducing both clinical and subclinical hypocalcaemia is by feeding a negative DCAD diet in the 21 days leading up to calving**.