FACTSHEET

AHDB

Milk Fever Focus

Milk fever is typical of the immediate post-calving period and occurs when the blood levels of calcium drop below normal (hypocalcaemia). Calcium is important to ensure correct nerve, muscle and intestinal function, and is also a key element in immune function. For this reason, hypocalcaemia can have significant repercussions on the health of the cow after calving, in both its clinical and subclinical (no obvious outward signs) form.

Milk fever is a ‘gateway disease’ for other diseases seen in early lactation such as retained foetal membranes, uterine prolapse, displaced abomasa and uterine infections (‘whites’). It also contributes to the negative energy balance of the fresh cow. Therefore, its prevention is a significant priority in the management of herd health.

Causes

The demand for calcium increases dramatically in the period around calving. This is due to rapid foetal development in the last trimester of pregnancy, production of colostrum, rapid increases in milk production in early lactation and depressed dry matter intake.

The demand for calcium at calving often exceeds that absorbed from the diet and available from internal sources, the main one being the skeleton. This results in low blood calcium or hypocalcaemia for 36–48 hours around calving.

Epidemiology

The average incidence of clinical hypocalcaemia has been reported to be 5–10%. However, in some herds, incidence rates can be as high as 34%. A suggested target value would be to achieve < 5% of clinical cases, although achieving ≤ 1% is achievable with effective management.

The incidence of subclinical hypocalcaemia is thought to be much higher. It has been estimated that at least 25% of first lactation heifers and 50% of ≥ 3rd lactation cows have subclinical milk fever in the periparturient period. A suggested target value would be to achieve < 20–30% of freshly calved cows suffering from subclinical hypocalcaemia.

Risk factors

- Increasing parity presents a risk for milk fever, especially beyond the 3rd lactation. The incidence increases by 9% each additional lactation after 1st calving
- Certain breeds (Jersey and other Channel Island breeds) are known to present a particular risk
- Certain familial lines will be more prone to suffering from milk fever. Heritability estimates for milk fever are believed to be low (0.07–0.18)
- High BCS at calving (≥ 4)
- Prepartum diet mineral composition
  - Too high calcium intake (>50g/day): prepartum requirements are low and when cows are fed too much calcium, the calcaemia regulation system at calving is impaired
  - High levels of phosphorus (>0.35%), which depresses calcium regulation
  - Low levels of magnesium (<0.4% DM), essential to ensure the production and action of PTH (parathyroid hormone), an essential hormone in calcium regulation
  - High DCAB (Dietary Cation-Anion Balance) (see below for further information)
- Low dry matter intake prepartum
- Dietary calcium
  - Post-calving requirements increase to ~50g/day, nearly a three-fold increase
  - The available calcium pool within the cow is 12g – less than one-third of the requirement, 5–20% of cows fail to mobilise sufficient calcium, and develop clinical hypocalcaemia
  - The lowest calcium levels are seen at 12–24 hours after calving
  - Dietary targets in transition ration 0.3–0.35% DM
  - Dietary targets are 0.39–0.5% DM
  - 24–48 hour pre-calving target blood levels are 0.8–1.3 mmol/L

Economic impacts

A clinical disease has an estimated cost of £200–250 (including cost of treatment, potential milk loss, culling, increased risks of other disease, and reduced fertility). The overall economic impact of the disease in a herd is significantly higher if we consider the higher incidence of subclinical cases.

Observed signs in clinical cases

- Grade 1 – the only signs are reduced DMI and milk yield. As it progresses, cows will appear unsteady when walking or standing, or show muscle tremors, and are excitable and hypersensitive
- Grade 2 – cow will present in sternal recumbency (sitting up on the brisket with the legs tucked under the body), with lower body temperature and signs of depression (lowered head and ears), stiff faeces, unable to rise, reduced rumen contractions
- Grade 3 – cow will present in lateral recumbency (lying on side), severely depressed, unresponsive, may show signs of spasm and convulsions, rumen bloat, regurgitation of rumen contents. This stage, often resulting in a coma, can be fatal. Not all cases will progress from grade 2 to 3

Blood calcium levels

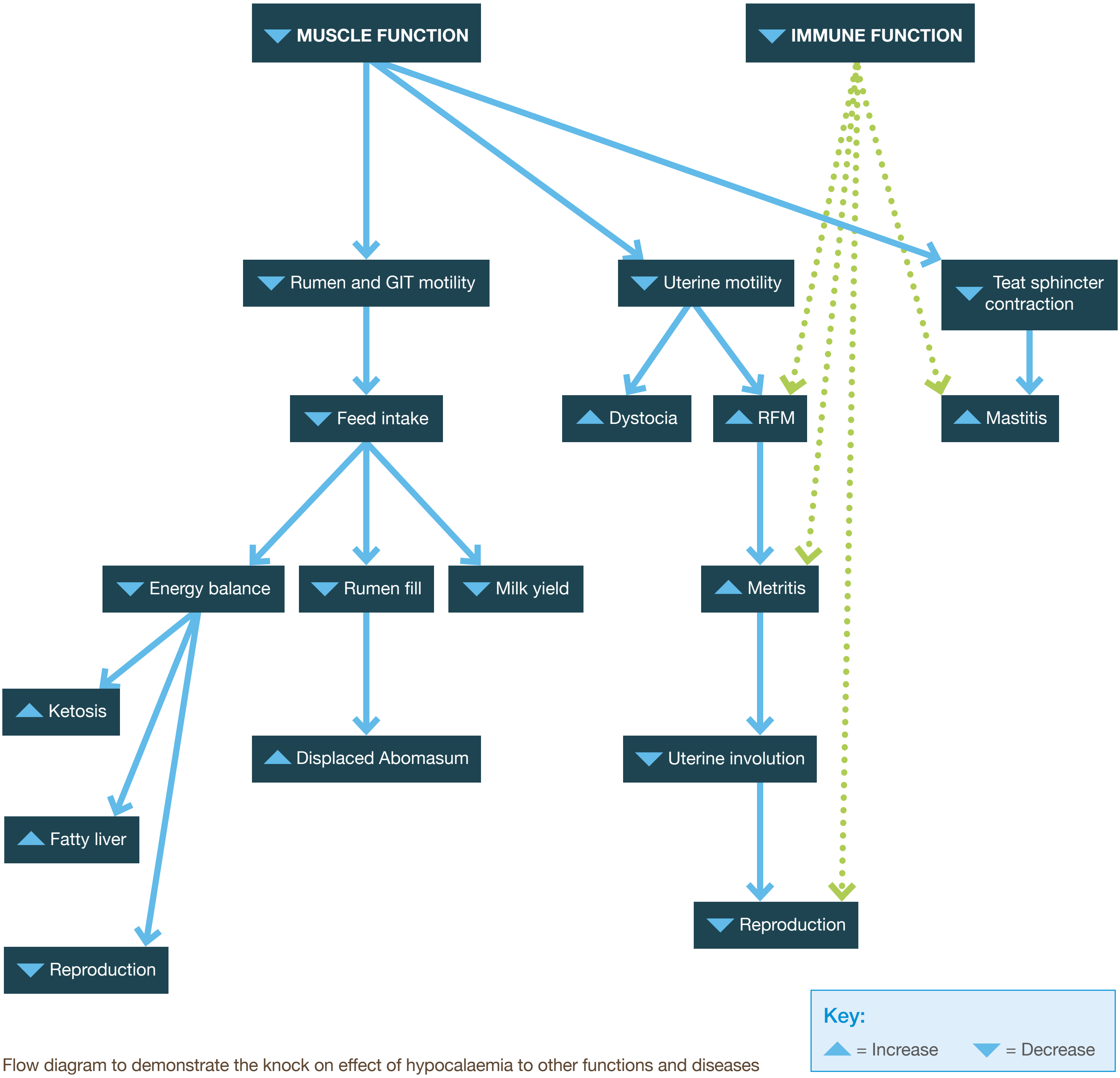
With clinical milk fever, the drop in blood levels is normally observed between 12 and 24 hours post–calving. Calcaemia can drop below < 1.4 mmol/L but it is difficult to predict exactly when a cow will go down from blood calcium (Ca) levels.

Clinical cases at peak lactation are often associated with oestrus, due to depressed DMI and high milk demand for calcium and recently dried off cows. The frequency of these cases is uncertain.

Normal blood calcium levels will be maintained between 2.1–2.4 mmol/L.

Subclinical milk fever: Blood levels between 1.4–2.0 mmol/L.

Figure 1. Cow in sternal recumbency



Flow diagram to demonstrate the knock on effect of hypocalaemia to other functions and diseases

Treatment options

Clinical milk fever

- Treatment of clinical milk fever should be undertaken as quickly as possible
- Recumbency due to clinical milk fever if unresolved rapidly contributes at least a third of all 'downer cows'
- Grade 1 cases are best treated with an oral calcium drench or bolus, and monitored closely
- Grades 2 and 3 require intravenous administration of calcium salts; liaise with your veterinary surgeon

Preventative strategies

Individual Level

Targeted calcium supplementation around calving

- High-risk cows – BCS ≥ 4, ≥ 3rd parity, dystocia, caesarean section, case in previous lactation, familial lines, Channel Island breeds
- Use calcium boluses or drenches
  - Often supply 40–50 g of calcium (calcium chloride, calcium sulphate and/or calcium propionate)
  - Recommended calcium, 4 doses over period of 12 hours pre 24 hours post-calving
  - More practical and appropriate to administer one at calving and one 12–24 hours post-calving

Herd level

Blanket calcium supplementation to multiparous cows

- Use as per individual level
- May be appropriate for smaller herds as a strategy to control milk fever
- Can be costly and time-consuming

DCAB (Dietary Cation Anion Balance)

The DCAB of a diet can be calculated from the equation DCAB (mEq/kg DM) = (K + Na) + (Cl + S). A negative DCAB (high in the anions Cl and S) result is a mild metabolic acidosis, which increases the ability of the cow to properly regulate calcium levels after calving. On the contrary, a positive DCAB (higher in the cations K and S) leads to a mild metabolic alkalosis, which impares the calcium regulation mechanisms. Manipulation of the DCAB before calving is an effective and common method used in the UK.

DCAB method for the prepartum diet

- An effective manipulation can be achieved in 4–5 days
- Requires a mineral analysis of the forages fed in the prepartum

Partial DCAB

- Achieves effective control of clinical hypocalcaemia, though will not completely control subclinical hypocalcaemia
- Aim – 100 to + 50 mEq/kgDM
- Achieved by selection of appropriate forages or subsets of forages, to control the K level in the diet (aim at K <1.3-1.5%DM)
- Analyse your forages and avoid those with K content > 2%
- Replace high-risk forages with those of reliably low risk, e.g. maize silage, wholecrop silage or straw
- Balance the diet with low DCAB feeds, e.g. straw, cereals, rapeseed meal, distillery and brewing by products
- Supplement magnesium using MgCl to reach desired level (>0.4% DM) and lower the DCAB
- Keep calcium at background levels (0.5–0.6% DM)

Full DCAB

- Aim -100 to -150 mEq/kgDM
- Addition of anionic salts (higher in CL and S than K and S) to prepartum ration, to approximately -100/150meq/kg DM
- Requires TMR feeding to get a proper mix of anionic salts in the ration. Anionic salts in excess can be unpalatable so always make sure dry matter intake is maintained
- A full DCAB diet will result in a lowered urine pH (down to 6). The adoption of this method requires regular urine pH monitoring (at least monthly) and after forage changes
- Dietary calcium can be fed at 0.8–1.2% DM, depending on the source

Calcium restriction

Restricting calcium supply in the prepartum period upregulates calcium regulation at calving, allowing it to be mobilised rapidly and meet increased demands. Achieving this via dietary manipulation or calcium binders is extremely difficult, due to the large amount of calcium present in forages in the UK.

Herd health planning

Routine monitoring

Urine pH

- Target will depend on whether a partial or full DCAB is being fed
  - Partial DCAB 7.8–8.1
  - Full DCAB 6.0–7.0

Urine micromineral analysis to check for excess dietary K, Mg adequacy and acid base status

Post-parturient calcium bloods

- Min group size 12
- Within 12–24 hours of calving
- Aim for < 20% of multiparous < 2 mmol/L

Regular review of the diet and forage analysis

Record and monitor incidence of clinical cases

Record and monitor incidence of other metabolic diseases, which may be linked to milk fever, i.e. retained foetal membranes, metritis, endometritis and LDA/RDAs

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Produced for you by:

AHDB Dairy
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2TL

T 024 7669 2051
E comms@ahdb.org.uk
W ahdb.org.uk
@AHDB_Dairy

40020 1222