

Milk fever: Causes, consequences, prevention



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Nowadays, dairy cows are real top athletes. This comes with additional challenges for their health and for on-farm management. Many of these problems can be traced back to supply deficits and can be easily managed with appropriate feed supplements.



Milk fever is a disease that occurs mainly in cows around calving. It is caused by an insufficient amount of calcium in the blood and particularly affects cows with a very high milk yield.

The link between calcium and milk fever

Calcium performs essential functions in the body. It is particularly important for the nervous system and muscle cells, and plays a central role in muscle contraction. If the calcium content in the blood is too low, the muscles can no longer contract. When this happens, the cows cannot move or stand up.

While mild cases may not be easily detectable, they still trigger productivity loss. If undetected, long-term calcium deficiency can even lead to cardiac arrest and thus to the death of the animal.

The development of milk fever

The cause of milk fever is a lack of sufficient calcium in the blood serum (hypocalcemia). The dairy cow has to abruptly change its metabolism at the end of the dry period, going from the resting phase to a high performance phase. During the dry period, cows have a relatively low need for calcium.

When lactation starts, the need for calcium suddenly almost doubles, as large amounts of calcium are required for the production of colostrum (2.3 g/l). The calcium is generally drawn from feed or from the bones. In older cows, the mobilization mechanism often does not start quickly enough. The supply from the bones and feed is insufficient and the body draws the missing calcium from the muscles. This ultimately leads to symptoms of paralysis and overstimulation of the nervous system.

Phases of milk fever

Stage One

In the initial phase of milk fever, the initial signs are

- muscle tremors
- restlessness
- stiff gait
- slightly elevated temperature

Stage Two

At this point, the cows lie on the stomach with an extended neck or the head is lying on the flank. Early symptoms of paralysis appear:

- fast, flat pulse
- cold body surface
- dilated pupils
- flatulence

Stage Three

In the last phase of milk fever, the cow lies on its side, loses consciousness and falls into a coma. The third phase often leads to death (the mortality rate averages 2 - 5%).

While the second phase of milk fever is easy to recognize due to the clear symptoms, the consequences of a "slight" calcium deficiency (Stage One) are often underestimated. Feed intake diminishes, the negative energy and protein balance is increased, and the cows barely move. The impairment of the muscles can cause problems in the udder (mastitis) or in the gastrointestinal tract.

Prevention and solutions

As cases of hypocalcemia immediately after calving may be as high as 50% among second- or third-lactation cows, it is important to act preventively to keep potential milk fever from developing. The dairy farmer's aim is to support the dairy cows that are at higher risk of milk fever, especially around the critical time of calving. The cows must be enabled to quickly release calcium from the bones after calving, or they must be supplied with calcium that can be easily metabolized.

Upfront prophylaxis

An energy and protein oversupply during the dry period should be avoided. In addition, an application of Vitamin D3 at the end of the pregnancy makes sense.

To stimulate the active regulatory mechanisms of calcium metabolism, the calcium content in the feed should be reduced three to four weeks before calving. In practice, however, this often is not properly observed and feed with a relatively high calcium content is still given out during this period.

There are, no doubt, farms where these above-mentioned preventive measures cannot be carried out due to operational reasons, just as there are animals that are particularly susceptible due to factors such as age, breed or healthy history.

To protect the cow from milk fever around calving, oral administration of calcium salts is widespread in practice. Vitamin D also plays a central role in calcium metabolism. It ensures that the absorption of

calcium from the intestines and bones is increased.

When administering oral calcium supplements, there are three important points:

- The cow must have sufficient calcium available per dosage
- The calcium must be available immediately
- Administration must be appropriate for the animals and farmers

Methods of calcium supplementation

To support the cow, oral supplements such as pastes and gels are widely used. They are useful, however they are also relatively difficult to administer, as they require handling the animal in relatively difficult ways.

Liquids are another way of administering calcium supplements. When administering liquids, it is important to make sure the animal does not choke so that the liquids do not get into the lungs.

Boluses are probably the easiest and safest method of supplementation to prevent milk fever. The bolus must naturally be carefully inserted, however the process is easy and requires minimal handling of the animal.

EW Nutrition's Calzogol Bolus is a dietetic mineral feed with a high level of calcium from highly available calcium salts and vitamin D3. The Calzogol Bolus contains several calcium sources with different release rates. One major advantage is the very high mucous membrane compatibility, which helps avoid irritation of the mouth, esophagus and rumen. Furthermore, the Calzogol Bolus does not contain caustic calcium chloride. The application is simple and economical, as only one bolus per dose must be administered at the time of calving.

Conclusion

Milk fever is very common in dairy herds. When a cow has milk fever, the farm can incur costs of approx. €350. This is reflected in the loss of milk yield up to 600 kg, losses due to unusable milk, and veterinary and medication costs.

Time resources are also to be taken into account: The economic repercussions represent a significant factor, however they come on top of the extra workload due to the increased need for care of animals.

Cows that suffer from calcium deficiency are also much more susceptible to other diseases. For the farmer, the best strategy is to avoid losses through prophylaxis. Feeding plays a central role; to ensure the best possible production conditions, oral calcium administrations, such as Calzogol Bolus, have proven themselves in practice.

by Judith Schmidt, Product Manager, On Farm Solutions

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Diarrhoea? Egg powder to the rescue



Another tool to reduce the use of antibiotics is the use of immunoglobulins from eggs. Trials showed that this product is effective to support a calf's start in life and also to offer support when challenged by various forms of diarrhoea.

The main cause for calf losses during the first two weeks of life is diarrhoea. In general diarrhoea is characterised by more liquid being secreted than that being resorbed. However, diarrhoea is not a disease, but actually only a symptom. Having diarrhoea has a protective function for the animal, because the higher liquid volume in the gut increases motility and pathogens and toxins are excreted faster. Diarrhoea can occur for several reasons. It can be caused by incorrect nutrition, but also by pathogens such as bacteria, viruses and protozoa.

Bacteria in the gut

E. coli belong to the normal gut flora of humans and animals and can be mainly found in the colon. Only a fraction of the serotypes causes diseases. The pathogenicity of *E. coli* is linked to virulence factors. Decisive virulence factors are for example the fimbria used for the attachment to the gut wall and the bacteria's ability to produce toxins.

Salmonella in general plays a secondary role in calf diarrhoea, however, salmonellosis in cattle is a notifiable disease. Disease due to *Clostridia* is amongst the most expensive one in cattle farming globally. In herbivores, clostridia are part of the normal gastro-intestinal flora, only a few types can cause serious disease. In calves, *Clostridium perfringens* occurs with the different types A, C, and D. *Rotaviruses* are the

most common viral pathogens causing diarrhoea in calves and lambs. They are mainly found at the age of 5 to 14 days. *Coronaviruses* normally attack calves at the age of 5 to 21 days. *Cryptosporidium parvum* is a protozoa and presumed to be the most common pathogen causing diarrhoea (prevalence up to more than 60 %) in calves.

Undigested feed and incorrect use of antibiotics

Plant raw materials (mainly soy products) are partly used in milk replacers as protein sources. These products contain carbohydrates, that cannot be digested by calves which can lead to diarrhoea. The transition from milk to milk replacer can also be a reason.

An early application of tetracyclines and neomycin to young calves can lead to a change in the villi, malabsorption and therefore to slight diarrhoea. Longer therapies using high dosages of antibiotics can also lead to a bacterial superinfection of the gut. The problem is that in a disease situation, antibiotics are often used incorrectly. The use of antibiotics only makes sense when there is a bacterial diarrhoea and not due to viruses, protozoa or poor feed management. To keep the use of antibiotics as low as possible, alternatives need to be considered.

Egg powder to add immunoglobulins

In order to achieve optimal results in calf rearing two approaches are possible. Firstly, the prophylaxis approach. This is the method of choice as diarrhoea can mostly be prevented. Therefore, it is necessary to supply the calf with the best possible equipment. As antibodies are one crucial but limiting factor in the colostrum of the “modern” cow, this gap needs to be minimised. A study conducted in Germany in 2015 demonstrated that more than 50% of the new-born calves had a deficiency of immunoglobulins in the blood. Only 41% of the calves showed an adequate concentration of antibodies in the blood (>10 mg IgG/ml blood serum). Immunoglobulins contained in hen eggs (IgY) can partly compensate for poor colostrum quality and serve as a care package for young animals. A trial was conducted with an egg powder product* on a dairy farm (800 cows) in Brandenburg, Germany. In total 39 new-born calves were observed until weaning (65th day of life). Before birth, the calves were already divided into control and trial group according to the lactation number of their mother cow. All calves were fed the same and received four litres of colostrum with ≥ 50 mg IgG /ml on the first day of life.

Control (n=20): no additional supplementation
 Trial group (n=19): day 1 - 5: 100 g of the egg powder product per animal per day mixed into the colostrum or milk.

It was shown that the calves in the trial group showed a significantly higher (13%) weaning weight (105.74 kg compared to 93.45 kg in the control group) and 18% higher average daily gain (999 g compared to 848 g in the control group) (Figure 1 and Figure 2).

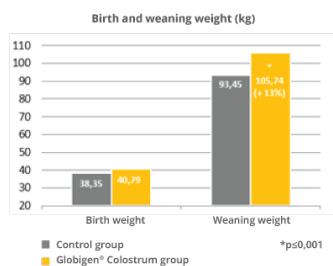


Figure 1: Effect of an egg powder product on weaning weight (kg)

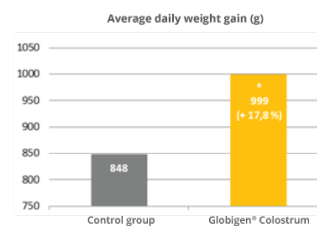


Figure 2: Effect of an egg powder product on ADG (g)

Support during acute diarrhoea

When diarrhoea occurs, the calf has to be treated. So the second approach is to find the best and quickest solution. It is not always necessary to use antibiotics, as they do not work against virus or protozoa. Egg antibodies can be an answer when combined with electrolytes as the following trial shows. On a dairy farm (550 cows) in Germany a feeding trial with a product based on egg powder and electrolytes** was conducted from December 2017 to May 2018. Two groups of calves were used. Before birth the animals were allocated into the two groups according to the calving plan and were examined from day one until weaning (77th day of life). All calves suffering from diarrhoea (38 in total, 17 in the control and 21 in the trial group) were treated as follows:

Control (n=17): Application of electrolytes

Trial group (n=21): 50 g of the egg powder and electrolytes product twice daily, stirred into the milk replacer until diarrhoea stopped.

If the diarrhoea did not stop or even got worse, the animals were treated with antibiotics. It was shown that in the control group the antibiotic treatment necessary was nearly twice as long as needed in the trial group (Figure 3). This means also that nearly twice the amount of antibiotics were used. This leads to the conclusion that calves in the trial group had an improved health status compared to calves in the control group. A further result from the improved health status was an increase in performance in the trial group (Figure 4).

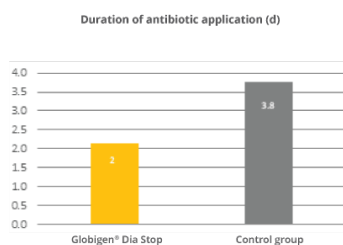


Figure 3: Duration of antibiotic application (d)

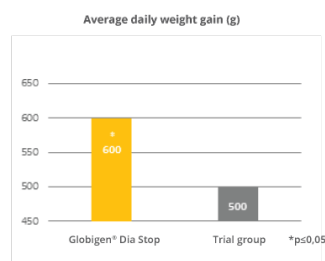


Figure 4: Effect on average daily weight gain (g)

The average daily weight gain of the trial group was 20% higher than in the control (600 vs. 500 g per day) leading to a significantly higher weaning weight (87.8 kg) than in the control (80.7 kg).

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