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Calf Note 206 – Adding electrolytes to milk or milk replacer

Introduction

I had a nice conversation by e-mail with a colleague in another country. He works with a dairy farm that was having serious problems with calf scours. They were feeding milk replacer to very young calves and the calves were experiencing watery, white diarrhea. They experienced some calf mortality from what appeared to be abomasal bloat. My friend was very concerned and wanted to help the farmer and his calves in every way possible. He reached out to me to ask my advice and find out what his next steps should be. I made a few comments and recommendations to him prior to his next visit to the farm in a few days.

The Follow up

Subsequent investigation indicated that more calves had died on the farm, and he gathered more information about the situation. One comment – almost as an aside – was that the farm was adding electrolytes to the milk replacer to replace the electrolytes being lost due to diarrhea. I realized that this might have been a big part of the problems on the farm... the producer wasn't helping his calves... here's why.

Things to remember

There are several things to remember about supporting calves with diarrhea – but the two most important are water and electrolytes.

Calves with diarrhea lose water and become dehydrated. I cover indices of dehydration in [Calf Note #43](#). It's important to remember that replacing lost water is a critical element of treatment with electrolytes! Therefore, adding the electrolyte powder to the milk replacer doesn't solve this very important problem. It's absolutely necessary to replace the water lost by calves with diarrhea and additional feedings of electrolytes – mixed in water – are needed.

The second problem with mixing electrolyte powder into milk or milk replacer is the change in osmolality of the liquid consumed by the calf. There are some good [references on osmolality](#), so I won't go into a detailed description here. What IS important to know is that the osmolality of milk or milk replacer affects the rate of abomasal emptying in the calf. Whole milk has an osmolality of about 300 mOsmol/L. Milk replacers are generally higher, but seldom exceed about 500 mOmol/L. Ingredients in electrolytes, such as sugar and sodium are highly osmotic – that is, they dramatically increase the osmolality of the solution. So, when we add a packet of electrolytes to milk or milk replacer, we can dramatically increase the osmolality of the liquid. When the osmolality exceeds about 600 mOsmol/L, then we'll slow down abomasal emptying until the calf's body can dilute the liquid so it can leave the abomasum.

What happens next? When liquid stays in the abomasum and can become substrate for the growth of bacteria. The bacterium *Clostridium perfringens* is a normal constituent of the animal's gastrointestinal flora. Normally, the flow of digesta down the gi tract is fast enough that this bacterium does not grow significantly within the tract. However, when the flow of liquid out of the

abomasum is impaired, this bacterium can begin to grow – explosively – within the abomasum. The resulting toxins, gas and acid all result in the characteristic “abomasal bloat”. Often, we don’t see clinical signs, as the onset of happens very quickly.

Summary

Don’t add powdered electrolytes to milk or milk replacer to treat scours. Just don’t.

Some resources regarding abomasal bloat are available online:

- [Abomasal Bloat and Abomasitis](#)
- [Causes and prevention of abomasal bloat in calves](#)
- [Head off abomasal bloat syndrome](#)
- [Acute bloat syndrome in dairy calves](#)

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