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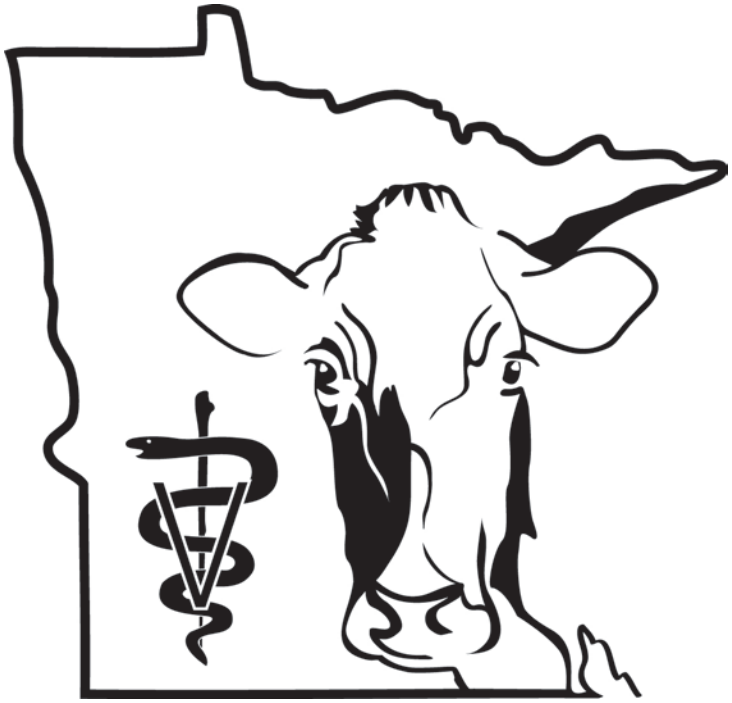

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# Factors to Concentrate on to Prevent Periparturient Disease in the Dairy Cow

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Most of the veterinary care for sick cows will be needed within 3 weeks of calving. Cows that develop one disease around the time of calving tend to develop other problems as well. If we can prevent a disease like milk fever we automatically reduce the risk of ketosis and mastitis in that herd as well.

I think that 90% of sick cow problems can be prevented if we can successfully prepare the cow for the stress of calving and the onset of lactation by focusing on these three areas.

## I. Prepare the rumen so that high energy feeds can be fed early in lactation to meet the energy needs of the cow.

-stimulating the growth of "good" bacterial species in the rumen.
-stimulating gowth of the rumen wall so absorption of nutrients is maximized.

How do we do this?

- need to introduce grain into the ration of the cow for at least 3 weeks before due date. Heifers especially may need to be on this diet for 5 weeks. Protein content of the transition ration should be 16%.

- in total mixed ration herds this means feeding a ration that has from .71 - .73 Mcal / lb feed for last three weeks of pregnancy, last 5 weeks for heifers

- in herds fed hay and a concentrate mix separately, grain should be introduced 4 weeks before calving and increased slowly over a period of two weeks so that during the last 2 weeks before calving the cows are eating .75 - 1% of their body weight as concentrate (8-12 lbs / day). If corn silage comprises a majority of the forage this number can be reduced. FEED HAY BEFORE GRAIN!

To maximize feed intake cows need to be dried off at body condition scores of 3.5. Above 3.75 is too fat and feed intake at calving will be depressed leading to fatty liver and ketosis.

Payoff - less ketosis, fewer displaced abomasums, less rumen acidosis and less lameness due to laminitis in early lactation.

## II. Prevent major decrease in blood calcium concentration at calving.

Because a tremendous amount of calcium is being put into colostrum and milk the cow's blood can become deficient in calcium. Severe cases result in milk fever. Less severe cases result in feed intake depression and poor muscle tone which in turn causes retained placenta, displaced abomasum, and environmental mastitis ( especially because the teat end won't close properly after milking).

How do we do this?

Dietary measures

1..Control cation-anion balance

- milk fever is usually caused by the presence of high potassium ( and in some cases sodium in heavily irrigated parts of N. America) cations in the diet. To some extent potassium can be counteracted by adding anionic salts to the diet, such as calcium chloride, ammonium chloride, or magnesium sulfate.

2. Provide adequate magnesium

-a lack of magnesium will prevent the hormones that defend against a drop in blood calcium from working properly. I recommend dietary magnesium levels that are much higher than current NRC recommendations.

A good mineral profile for a transition cow ( last 3-4 weeks of gestation) diet

| | |
|---|---|
| - calcium | 1-1.2% |
| - phosphorus | 0.4 - 0.5 % |
| - magnesium | 0.4 % |
| - sodium | as close to 0.1% as possible |
| - potassium | as close to 0.7% as possible |

**This is a problem - most diets will be workable if you can get down to 1.5-1.8% potassium**

| | |
|---|---|
| - sulfur | 0.3- 0.4% |
| - chloride | high enough to bring urine pH between 6 and 6.8** (target for Jerseys is between 5.8 and 6.5) |

My current philosophy is to formulate the ration using forages with the lowest potassium content that I can find that are still reasonably well digestible. Corn silage is excellent. Beet pulp without molasses, some distillers grains or brewers grains, and corn gluten feed can often be used as well in the diet. First cutting of hays or alfalfa are generally higher in potassium than late cuttings grown under dry conditions. DO NOT TRUST POTASSIUM VALUES DETERMINED BY NEAR INFRARED ANALYSIS.

I next add magnesium sulfate or magnesium chloride to the diet to bring magnesium content to 0.4%. Then , if needed, I add dicalcium phosphate to bring phosphorus to .45%. Then I add calcium chloride to bring chloride to 0.55%. Add calcium carbonate to bring calcium to 1%. In some cases a small amount of calcium propionate (0.25 lbs/day) can also be used to help increase dietary calcium and at the same time supply propionate which the cow will convert to glucose ( problem = cost).

This is where I start. If urine pH is not low enough I will add more calcium chloride to the ration. Add as little as possible to get the job done - too much risks knocking the cows off feed as anionic salts are generally unpalatable

FUTURE - Hydrochloric acid may be available as a cheap and more palatable source of anions to prevent milk fever. I would then use it in place of calcium chloride. Would likely add some calcium carbonate to diets to get to 1% calcium though some calcium could come from calcium propionate .

3. Oral calcium supplements the day of calving

- boost blood calcium for 6-10 hrs at time the cow needs them most.

| Calcium chloride based supplements | Calcium propionate based |
|---|---|
| advantages | advantages |
| -cheaper | -not as irritating |
| -less volume to give | -rapidly absorbed |
| -rapidly absorbed | -supplies energy and calcium |
| disadvantages | disadvantages |
| - caustic!! | - requires more volume |
| | - slightly more expensive |

Drenches are more effective than gels or pastes but have greater chance of causing aspiration pneumonia if they go into windpipe instead of stomach when administered incorrectly!!

## III. Maintaining a strong immune system

At calving all cows white blood cells show a decreased ability to fight off infections which increases the susceptibility to mastitis and uterine infections. In part the immune suppression is thought to be due to changes in hormones at calving. However better nutrition can also strengthen the immune system at this time.

How do we do this?

1. Prevent milk fever
   -milk fever causes tremendous release of cortisol which inactivates the immune cells

2. Feed adequate selenium
   - 0.3 ppm is legal limit in USA. In some situations this is not enough!
   - injectable selenium may be an option.

3. Feed vitamin E to animals without access to pasture.
   - I believe recent work suggesting that adequate vitamin E requires 2000 IU / day for the 2 weeks before and after calving. Much higher than NRCsuggests!!! Expensive, but worth it if it prevents just one case of mastitis / 100 cows.
   - injectable vitamin E is an option also. 5 g intramuscularly 30 days before calving and again within a week of calving. Occasional abscess at injection site!

4. Prevent energy and protein deficiency (See I above)

5. Supply trace minerals at 20 - 50% above NRC recommendations to account for decline in dry matter intake that accompanies calving.
   - copper and zinc deficiency seem to be the problems I see most in Midwest often caused by too much iron in the ration and the water!!

Payoff
Less mastitis, less retained placenta ( enhancement of neutrophil attack on fetal tissues!) and uterine infection.

For more details on the physiology of periparturient disease readers are referred to:

Goff, JP and R.L. Horst. Physiological Changes at Parturition and Their Relationship to Metabolic Diseases. J Dairy Science 80: 1260, 1997