WEST CENTRAL®

SoyChlor®

Technical Bulletin

The Case for Considering the Effects and Prevention of Subclinical Hypocalcemia

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Approximately 50% of dairy cows have one or more adverse health events during the transition period (6). Additionally, of cows that leave dairy herds, approximately 25% leave during the first 60 days in milk (with an uncertain additional percentage of animals leaving dairy herds after the first 60 days in milk) because of problems that can be traced back to difficulty during the transition period (7, 9). Many health disorders that occur in early lactation can be linked to the effects of milk fever (hypocalcemia) (5).

Annually, milk fever affects 6% of the dairy cows in the US (16). Although its presence is not always recognized, a growing body of research indicates that up to 60% or more of a dairy herd can experience the ill effects of this subclinical hypocalcemia (1,4, 10). This is in herds that experience very few clinical cases of milk fever.

Subclinical hypocalcemia means that the cow's blood calcium is low (<8 mg/dl) but just not low enough to cause the cow to go down and not be able to get up. Subclinical hypocalcemia has been linked to many postpartum disorders. Cows with this type of milk fever have sluggish early lactations and are more prone to displaced abomasums, retained placentas, ketosis, mastitis and other fresh cow problems (5). Subclinical hypocalcemia has also been linked to decreased reproductive efficiency (2).

In a NAHMS survey conducted in 2002 on over 1400 dairy cows, researchers determined that 25, 42 and 53% of 1st, 2nd and ³ 3rd lactation cows, respectively, had blood calcium levels of <8 mg/dl. Additionally the cows that were being fed rations balanced for DCAD had higher blood calcium and lower blood NEFA levels at calving (Horst, personal communication).

Feeding

The close-up ration is perhaps the most important ration on the dairy. In fresh dairy cows, low blood calcium levels have been attributed to the alkalizing effect of the pre-fresh ration. Feeding a diet properly balanced for dietary cation anion difference (DCAD) can prevent milk fever by causing the cow's blood to become slightly acidic. This slight acidosis helps parathyroid hormone (PTH), the main hormone that controls the blood level of calcium, work better (12) (Figure 1.) If a herd is having metabolic problems early postpartum e.g., milk fever, retained placenta, etc. the DCAD of the ration is likely positive (3).

To reduce the incidence of milk fever, many close up rations are being formulated for low potassium and low calcium levels. These rations are usually effective in the prevention of clinical milk fever. Feeding corn silage as the main forage source and selecting hays that are relatively low in potassium can accomplish this goal. However, these diets still have an alkalizing effect and leave the strong possibility of subclinical hypocalcemia lurking on the dairy.

In a Michigan State University study seven out eight cows fed a diet with a positive DCAD (+150 meq/kg) had subclinical hypocalcemia after freshening and four out of eight cows fed a diet of 0 DCAD experienced hypocalcemia with three of these being clinical (13). No cases of hypocalcemia were observed in the cows fed the negative DCAD diet (-150 meq/kg.)

Additionally, the cows on the low DCAD diet had lower blood NEFA levels than those on the other diets. This is most likely attributed to the fact the cows fed the negative DCAD diet did not experience as great of a decline in prepartum DMI as did those cows fed the other diets.

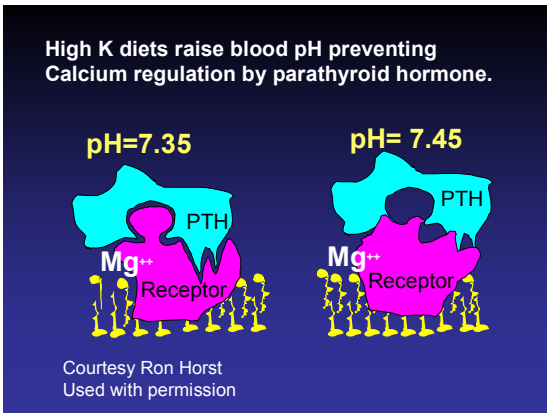

Figure 1.

Updated Nutrient Specifications

In recent analyses over a six-month period, the chloride levels or SoyChlor® 16 and SoyChlor® 16-7 were found to be 7.3 and 10.3%, respectively.

The updated nutrient values for SoyChlor® are in the following table:

100% Dry Matter	SoyChlor® 16		SoyChlor® 16-7	
Dry Matter	87.70 %	SD = 0.94	88.38 %	SD = 0.90
Crude Protein	24.58 %	SD = 0.97	23.22 %	SD = 0.75
NPN (CP equiv.)	<1%		<1%	
ADF	21.51 %	SD = 1.08	17.85 %	SD = 1.70
Fat	8.64 %	SD = 0.34	7.17 %	
Calcium	2.00 %	SD = 0.07	4.04 %	SD = 0.19
Phosphorus	0.45 %	SD = 0.01	0.40 %	SD = 0.03
Magnesium	1.58 %	SD = 0.06	2.65 %	SD = 0.24
Potassium	0.67 %	SD = 0.03	0.70 %	SD = 0.05
Sodium	0.11 %	SD = 0.02	0.15 %	SD = 0.02
Chlorine	7.32 %	SD = 0.11	10.29 %	SD = 0.20
Sulfur	0.39 %	SD = 0.06	0.35 %	SD = 0.04
DCAD	- 2088		- 2876	

Total nutrient specification sheets are available by calling 800-843-4769.

Benefits of Chloride

Anionic salts are those salts that contain more strong anions than cations (14). These include ammonium chloride, calcium chloride, magnesium chloride, calcium sulfate and magnesium sulfate. The chloride salts are more effective in reducing pH than the sulfate salts. Unfortunately, the anionic salts also deliver a cation to the ration along with the anions. This cation works in raising pH making the anionic salts less effective at reducing pH.

SoyChlor® is manufactured using only hydrochloric acid, the most effective metabolic acidifier (8) (Figure 2.) Hydrochloric acid delivers only chloride ions that reduce pH. With the highest levels of chloride from hydrochloric acid, no other anionic source is as effective as SoyChlor®. SoyChlor® is the most flexible high chloride source for close up dairy cows.

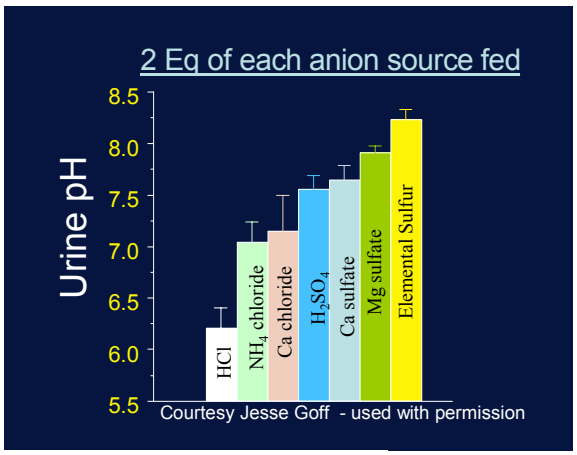

Figure 2.

Palatability

Hydrochloric acid is the most palatable source of chloride. The anionic salts are bitter and can cause a reduction in dry matter intake if fed at too high a level or not masked completely with silages and grains. Unlike the bitter tasting anionic salts SoyChlor® has a unique flavor that is preferred by cows the world over. Reports from the field suggest dry matter intakes of 30 pounds or higher when feeding SoyChlor® 16-7 at rates of 3 pounds.

Protein

The 2001 Dairy NRC recommends low protein diets for close up dairy cows. Most evidence points toward a fairly low crude protein (12%) diet as being best for close-up cows. The protein needs of the transition cow are really quite low and energy must be used to detoxify the extra ammonia. The overfeeding of protein can have negative effects on the next lactation. The negative effects are probably worse for sources of non-protein nitrogen (15,17,18). **The data in these trials suggest that herds prone to fatty livers should not feed diets containing large amounts of soluble protein and NPN.** As an all-natural protein source SoyChlor® offers nutritionists an effective chloride alternative to the high NPN anionic sources.

An effective range of urine pH, to minimize postpartum disease, should be the goal of the close-up DCAD program. To achieve a pH range of 6.0 – 7.0 the anionic source needs to be adjusted to the correct level. Making ration adjustments with SoyChlor® has minimal effect on the protein level of the ration. SoyChlor® allows dairy nutritionists to feed a high chloride to reach the right pH range without overfeeding dietary protein, especially in the form of NPN.

Heifers on the other hand require more crude protein because they are still growing (15%).

Economics

Milk fever costs a dairy an average of $334 per case (11). The other postpartum diseases linked thyhypocalcemia and their costs are listed in the following table.

Cost

Disease	Cost (Guard, 1996)	Die %	Culled %	Lost milk (lb.)	Extra Days Open	Association with Milk Fever (Curtis, 1983)
Milk Fever	$334	8	12	1100	5	-
Ketosis	$145	1	5	440	-	8.9
Retained Placenta	$285	1	18	750	19	2.8
Displaced Abomasum	$340	2	10	840	6	3.4

Avoiding the diseases associated with hypocalcemia and keeping cows in the herd longer also adds to the bottom line.

Additionally, even in herds where clinical milk fever and ketosis are not major problems, an additional 700 to 1,000 pounds of milk can be gained by avoiding subclinical hypocalcemia. Feeding SoyChlor® in a close-up ration properly balanced for DCAD can yield a 3:1 return on investment in milk alone. Add to that the additional savings from avoiding fresh cow metabolic diseases and feeding SoyChlor® in a properly balanced ration is one of the best decisions you can make when it comes to close-up cow nutrition.

Estimate of Return on SoyChlor Investment* (reduction of milk fever cases and increased milk)

	Milk Price		
Herd Size	$10.00	$11.00	$13.00
60	$2036	$2225	$2602
100	$3393	$3708	$4388
200	$6786	$7416	$8676
500	$16965	$18540	$21690

*Assumes 5% milk fever, 50% Subclinical hypocalcemia are reduced by 90% by feeding SoyChlor®
700 lb. increase in milk (Beede, 1992)