

# NUTRITION PLUS

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## SUBTLE BUT SIGNIFICANT LOSSES FROM SUBCLINICAL HYPOCALCEMIA

**R**esearchers, nutritional consultants and dairy producers have made great progress the last decade in managing close-up and early lactation rations to avoid milk fever and its accompanying losses, both direct and indirect. The next frontier may be to tackle the less visible form of the condition, which studies are showing may be more prevalent than formerly believed.

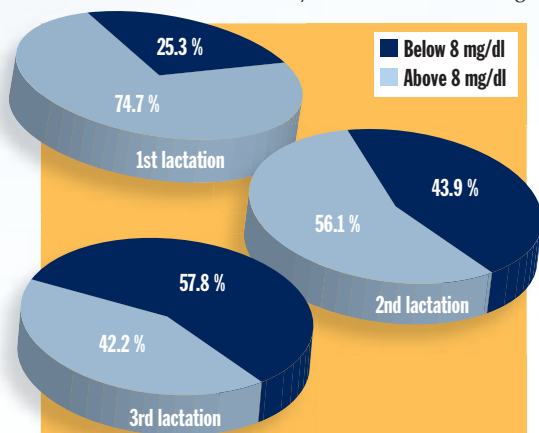
Cows that suffer from such “subclinical hypocalcemia”—subnormal calcium blood levels that do not drop low enough to bring on clinical milk fever but nonetheless exact a production toll—show few or no outward signs.

A study reported at the 2003 Annual American Dairy Science Association Meetings in Phoenix, Ariz., by USDA researchers Dr. Ron Horst, Dr. Jesse Goff and Dr. Brian McCluskey, evaluated blood samples from 1,446 cows on 480 dairies across 21 states, as part of the USDA’s National Animal Health Monitoring System Dairy 2002 study. The cows were sampled within 48 hours of calving and divided into three study groups: those in first lactation, those in second lactation and those on their third or greater lactation.

Subclinical hypocalcemia—defined in this case as serum calcium less than 8.0 mg per dl—affected at least one in four first-lactation cows and increased to nearly six in 10 of the older groups.

This national survey echoed earlier studies in individual university herds which also suggested that half of all dairy cows and two-thirds of multiparous cows may suffer from subclinical hypocalcemia at calving.

Concurrent surveys of the dairies’ feeding management program found that just under 39 percent of the study cows were on a DCAD program. As with the cows that were not on a DCAD program, age tended to increase the incidence of the condition. However, offering a DCAD ration was associated with a significantly lower incidence of the condition. And



Drs. Horst, Goff and McCluskey measured calcium levels in the blood of cows within 48 hours of calving and found more than half the older animals were suffering from hypocalcemia, even when on a DCAD program—although anionic balancing did make a significant improvement in the condition.

SOURCE: JOURNAL OF DAIRY SCIENCE, 2003, VOLUME 86 (SUPPLEMENT 1):PAGE 247-248.

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# MANAGEABLE PREVENTION

Managing the nutrition program on commercial dairies to avoid or reduce the impact of hypocalcemia — sub-clinical or clinical — continues to challenge us. Many operations may incorporate anionic salts without the ability or attentiveness to manage them well enough to maintain urine pH in the 6.0 to 7.0 range that's necessary for effectiveness.

However, the effort required to feed DCAD diets is worth the investment of time, effort and resources, in order to reduce metabolic disease to a manageable level, says Standard Nutrition dairy nutritionist Dan Hein. The challenge, says the Appleton, Wis., consultant, is to customize a program to the unique situation of each dairy so it is manageable.

"The availability of low-potassium forages can be difficult on most of our Wisconsin dairies," he says. "Anionic diets allow my clients to gain the benefits of DCAD diets. As a consultant, I think my job is to brainstorm with my clients on how we can implement the diets, attain our pH goal, and adjust the diet routinely as potassium levels change."

### A CHLORIDE COWS PREFER

Unlike the bitter tasting anionic salts, hydrochloric-acid-treated products like SoyChlor® are more palatable than ionic salts and preferred by cows.

West Central has gone to considerable efforts to lower both the potassium and sodium levels in SoyChlor, to avoid the self-defeating addition of cations to the ration. When feeding SoyChlor, you are not only feeding a palatable chloride source, but also diluting the potassium and sodium in the ration. Most dairies feed about 2.5 pounds per head per day. Reports from the field suggest dry matter intakes of 28 pounds or higher can occur when using a hydrochloric acid product.

An important aspect of that flexibility is helping client dairies develop, and then correctly use, a monitoring program that encourages personnel to collect and analyze the data to measure results.

And of course, factors that affect cow comfort and encourage intake remain a cornerstone. DCAD balance should be considered fine-tuning for calcium management, not the starting point.

## BEYOND BYPASS

### DON'T NEGLECT VALUE OF MICROBIAL PROTEIN

Attempting to improve the amount of undegradable intake protein provided to high-producing cows should not direct focus away from effectively feeding the rumen process via degradable intake protein. Microbial protein is a naturally high source of balanced amino acids. In fact, the amino-acid profile of rumen bacteria and protozoa more nearly match the profile of milk than any feedstuff. It's estimated that at least 70 percent of absorbed amino acids come from microbial origin.

That's why balancing amino acids and maximizing milk-component output begins with balancing the carbohydrate and protein supply

## WEST CENTRAL HAPPENINGS

West Central began service out of its terminal loading facility in Des Moines this month. This terminal is the first in the state of Iowa and offers customers the opportunity to blend premium SoyPOWER® biodiesel with petroleum diesel at the pump. This method eliminates the need for extra storage tanks and extra hauling.

By inserting a pre-programmed magnetic key at the pump, customers are able to purchase the amount of SoyPOWER biodiesel needed to

## FROM THE MATERNITY PEN

# TRANSITION CRUDE PROTEIN LEVELS

Despite "prodigious" amounts of research in the past 15 years, notes Cornell animal scientist Dr. Thomas Overton, several aspects of transition diet formulation and its effect on physiology remain a problem for many operations. One current example: Protein requirements.

In its first attempt to address transition-cow nutrition in 2001, the NRC retained the 12 percent crude protein for dry cow diets recommended in its 1989 edition. That being said, Dr. Overton notes, it is important to recognize NRC also abandoned crude protein as a measure of protein adequacy in favor of the metabolizable protein system. Under MP formulation, Dr. Overton recom-

mends close-up diets consumed at 24 to 26 pounds per day provide about 1,100 to 1,200 grams of metabolizable protein. That means if diets fall within the 34 percent to 38 percent non-fiber carbohydrate range he also recommends during transition, crude protein would calculate out at between 13 and 15 percent.

"We really need to be looking at protein supply on a metabolizable basis, and that means close-up diets should run in the 13 to 14 percent range under the old system. Feeding close-up diets containing more than 15 percent crude protein is not advantageous and may be detrimental."

Maintaining that relatively low crude protein level has been a challenge for

many nutrition consultants, because the common anionic chloride sources are high in crude protein — particularly non-proteinous nitrogen — as well as sodium, potassium and phosphorus. Though ammonium chloride and ammonium sulfate pack a concentrated negative ion boost into a small package, they exact a potential productivity cost by bundling it with high levels of soluble nitrogen.

When cows are oversupplemented, extra energy must be used to detoxify the additional ammonia. Dr. Overton suggests that increased ammonia load on the animal may affect the capacity of the liver — already burdened by triglycerides during the prepartum period—to

## QUALITY CORNER

in the rumen to maximize efficiency of microbe production. That balance begins with consistent and high dry matter intake, coupled with sufficient physically effective neutral detergent fiber to keep the rumen healthy.

Even as it bypasses more lysine and methionine than other protein sources, SoyPLUS® from West Central combines high protein quality with outstanding consistency and palatability. Moreover, the rumen-degradable protein fraction in SoyPLUS provides protein sources necessary for optimum microbial yield. It contains 23 percent NFC with an excellent profile of sugars, starches and highly digestible soluble fiber, preserved by the patented SoyPLUS process to drive rumen microbial growth, enhance ruminal digestion and improve digestion of the entire ration.

achieve the blend they'd like, topping off the petroleum purchase already in the tank. Biodiesel can be purchased from the blending facility at any time, 24 hours a day, 365 days a year.

SoyPOWER biodiesel is a high-quality, premium, refined biodiesel made from 100 percent soybean oil. Easy to use in existing diesel systems, it reduces exhaust emissions, without sacrificing performance and fuel economy.

synthesize glucose. The negative effects are probably worse when the protein sources are non-protein nitrogen. As a result, herds prone to fatty livers should not receive diets containing large amounts of soluble protein and NPN.

### LOW-NPN CHLORIDE SOURCE

As an all-natural protein source, SoyChlor offers nutritionists an effective chloride alternative to the high NPN anionic sources. Special care has been taken to also make SoyChlor low in sodium, potassium and phosphorus.

SoyChlor allows dairy nutritionists to feed a high chloride level to reach the right pH range without over-feeding dietary protein, especially in the form of NPN.

## I HEARD FROM ONE OF YOUR COMPETITORS THAT SOYCHLOR LOSES ITS POTENCY OVER TIME. IS THIS TRUE?

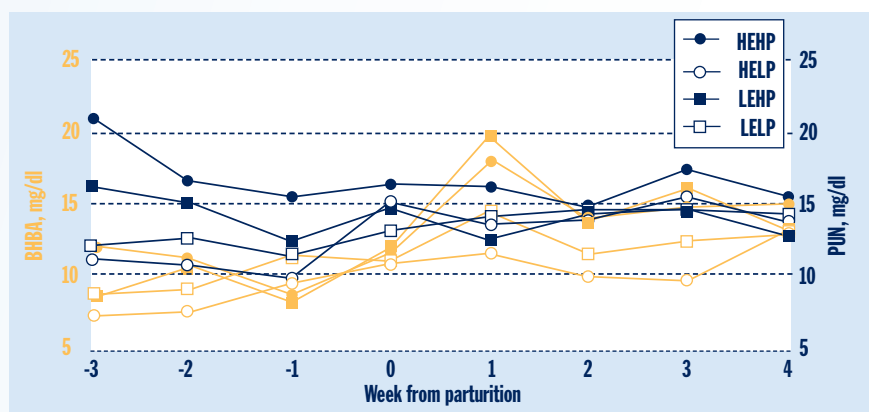
No. In a recent study, 14 random samples were tested from all runs over a nine-month period. They proved consistency that does not change over time. The coefficient of variation for chloride, dry matter, crude protein and calcium were all less than 5 percent—chloride came in under 2 percent!

	Percent (As Fed)	Standard Deviation
Dry Matter (N=14)	88.38	0.90
Crude Protein (N=14)	20.52	0.66
Chloride (N=14)	9.09	0.18
Sodium (N=14)	0.13	0.02
Potassium (N=14)	0.62	0.04
Sulfur (N=14)	0.31	0.04
Magnesium (N=14)	2.34	0.21
Calcium (N=14)	3.57	0.17

The production of SoyPLUS includes a very stringent quality control program. In addition to continuous monitoring using an in house NIR, check samples are sent to Woodson - Tenent Laboratories in Des Moines.

Results from Woodson - Tenent for April to June, 2004 are shown below.

	Percent	Standard Deviation
Dry Matter (N=23)	89.13	0.71
Crude Protein (N=23)	43.95	0.72
Crude Fat (N=23)	6.03	0.33
ADF (N=18)	8.31	0.63
NDF (N=18)	16.58	1.02
ADICP (N=18)	2.46	0.20
NDICP (N=18)	7.70	0.70



Recent work conducted at the University of Alberta began feeding cows at 21 days before expected calving one of four diets: high energy-high protein (HEHP), high energy-low protein (HELP), low energy-high protein (LEHP), or low energy-low protein (LELP). Liver biopsies and blood samples before and during the trial demonstrate the relative effect excess protein can have on the animal's ammonia load and ketone bodies in the blood.

SOURCE: DOEPEL L, LAPIERRE H, KENNELLY JJ. PERIPARTUM PERFORMANCE AND METABOLISM OF DAIRY COWS IN RESPONSE TO PREPARTUM ENERGY AND PROTEIN INTAKE. J DAIRY SCI. 2002 SEP;85(9):2315-34.



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## IN THIS ISSUE

- New research demonstrates the surprising extent of subclinical hypocalcemia.
- One dairy consultant's advice: DCAD programs are as diverse as client dairies. Making them a success requires making them manageable.
- Too much crude protein for transition cows...more than just wasteful?
- Don't lose sight of the importance of good microbial protein.

## SUBTLE BUT SIGNIFICANT LOSSES FROM SUBCLINICAL HYPOCALCEMIA CONTINUED FROM PAGE 1

it made the largest relative difference in the oldest group.

Because cows with calcium deficiency tend to eat less, it should come as little surprise that results from this study found that animals with calcium values more than 8 mg per dl also had lower serum NEFAs, indicating that those with normal calcium levels were in better energy balance.

The severe hypocalcemia that results in clinical milk fever has long been understood to contribute to other metabolic diseases. Because calcium is a necessary component for muscle contractions as well as normal appetite, milk fever has been associated with increased mastitis, ketosis, dystocia, retained fetal membranes, prolapsed uterus, metritis and displaced abomasum. According to Dr. Horst,

there is no reason to believe the large proportion of cows suffering from this subclinical form of the condition should not also be more prone to some degree of those metabolic diseases. Plus, studies tracking performance in subsequent lactations have found cows suffering from subclinical hypocalcemia produce approximately 850 pounds less milk per year than those with normal levels.

"Much of the industry does not recognize or take into account sub-clinical hypocalcemia, since the cows are not down with full-blown milk fever," says West Central Director of Research Dr. Phillip Jardon. "However, even absent overt signs, the metabolic diseases and relative costs associated with this disease are very significant and should not be overlooked."



Subclinical levels of calcium deficiency that do not become full blown milk fever may be an underappreciated health problem, particularly for older cows, according to USDA researcher Dr. Ron Horst.