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## Water: The Most Important Dairy Nutrient

You provide crop-growing and purchasing advice. You evaluate forages. You balance and re-balance rations for dozens of nutritional factors. And yet you may be overlooking the most important aspect of your clients' dairy nutrition.

According to Michigan State University Professor of Animal Science David Beede, PhD, all of that effort could be for naught if your clients have substandard water supplies. "Water as an essential nutrient is second only to oxygen in importance to sustain life and optimize growth, lactation and reproduction of dairy cattle," says Beede. "The water requirement per unit of body mass of a high-producing dairy cow is greater than that of any other land-based mammal." Beede advises that, based on formulas that factor in milk yield, dry-matter intake and dietary dry-matter percentage, adult lactating dairy cows should drink approximately 19 to 25 gallons of water per day.

Within normal physiological limits, there is a direct positive relationship between water intake and feed intake. In other words, the best TMR on the planet will not yield maximum performance if water quality issues interfere with its consumption or digestion.

Water quality factors that can affect dairy cow performance include odor and taste; physical and chemical properties; presence of toxic compounds; concentration of macro- and micromineral elements; and microbial contamination. Excess concentrations of some of these factors may impact palatability and intake. Others may affect the animal's digestive and physiological functions once consumed and absorbed.

In still other cases, water quality may be acceptable, but access to water may be the problem. Dairy nutrition consultant Jennifer Swim of J.E.Swim Dairy Consulting, Inc., Cambridge City, Ind., says challenges often arise when dairies expand or build new facilities. "Installing additional water receptacles often is overlooked in building plans, even if more cows are added to stocking areas," she notes. "But if you see cows having to wait to get a drink, more watering



areas, and/or greater water-filling capacity, are needed."

Beede adds that placement of water troughs should factor in animal behavior, as "boss cows" can guard waterers if they are too small or placed in areas with limited access. He also advises that:

- Cows should never have to walk more than 50 feet to get a drink of water.
- Head clearance around water troughs should be at least two feet on every side.
- Tanks or troughs should provide a filled water depth of only six to 12 inches.

Limited research studies have shown that cows prefer to drink warm water versus chilled water, even in hot climates. Swim recommends that all of her clients provide clean, free-choice warm water to fresh cows immediately postpartum. "I think it's a very natural way to help cows rehydrate themselves, expel their placentas and get off to a healthy lactation," she says.

Beede suggests that the following symptoms may signal a water-quality issue in a herd:

- Abnormally firm manure
- Reduced urine output
- Infrequent drinking activity
- Drinking of urine or from puddles (although this could be an indicator of dietary imbalance as well)
- Dehydration
- Loss of body weight or condition
- Low blood hematocrit readings

As a routine component of comprehensive nutrition consulting, Beede recommends at least annual evaluation of every dairy's drinking water. For a complete text of Beede's water-quality guidelines, [click here](#).

## WATER ANALYSIS GUIDELINES

When sampling a dairy's water for analysis, Michigan State University researcher David Beede, PhD, suggests contacting a reputable, certified laboratory and asking for a "Livestock Suitability" water analysis. The lab should be able to tell you:

How to take a representative sample

How much sample is needed

In what type of container the sample should be collected and shipped

Types of analyses (chemical and microbial) that can be performed with "livestock" analysis, and others that may be applicable in your situation.

Suggested standard minimum initial analysis includes total dissolved solids (TDS), sodium, calcium, magnesium, chloride, sulfate, pH, nitrates, iron, manganese, copper, hardness, conductivity and possibly total coliform count.

### CONSULTANT'S CORNER

## Water Is A Consideration For Every Dairy



*By Jennifer Swim, J.E. Swim Dairy Consulting, Inc., Cambridge City, Ind.*

When I started working as a dairy nutrition consultant more than 30 years ago, water was something that was just "there." I didn't give it much consideration unless health problems abruptly surfaced among the baby calves and/or young children on a farm, because those vulnerable populations will succumb first to bacterial or parasitic water contamination.

My attitude changed when I encountered a herd that was really struggling, and no one could explain why. The owners recently had built a new barn and installed new waterers in different locations.

Dry-matter intake was excellent, feedstuffs were good quality, and overall the ration was well-balanced and efficiently delivered. But milk production was lagging, the cows were in poor body condition, hair coats were rough, and the herd was experiencing a host of metabolic disease problems.

When it finally occurred to me to test the farm's water, we found extremely elevated iron levels. While the iron itself posed little problem to the animals, its presence was feeding iron-loving bacteria that were contaminating the water and suppressing drinking behavior. I hypothesize that the cows actually were eating so much because they were thirsty. But without adequate water intake, they were not able to properly digest the ration and capitalize on their high dry-matter intake.

The solution was fairly easy. We installed a peroxide injector in the well for less than \$500, and the turn-around was almost instantaneous. Cows started gaining weight and milk production increased practically overnight. I firmly believe that this farm is still in business today because their water problem was addressed.

As in this case, many times the "fix" need not be costly. There are many expensive water-treatment systems available, sometimes promoted by unscrupulous salespeople, which may not be cost-efficient for dairies. Before investing in a water treatment system, I encourage my clients to thoroughly diagnose their water problems—if any—and insist on science-based research to support the treatment products they are considering. Some systems rely heavily on chlorination, which can both suppress water intake and damage plumbing equipment over time. A region of Ohio that I serve does have a serious sulfur issue. Many farms in that area have invested heavily in water treatment systems to improve their water palatability, and those systems have worked well.

Today, water is much higher on my radar screen. I advise all of my clients to develop and implement a regular water-trough-cleaning protocol. When diagnosing problem herds, I recommend screening for iron, sulfur, hardness, pH, total dissolved solids and sodium. Some of my clients also use flow meters to measure intake. My most successful herds are the ones managed by individuals who pay excellent attention to details, including water. I would personally drink from the water troughs on those well-managed farms.

## **HAPPENINGS**

West Central's SoyPLUS<sup>®</sup> and SoyChlor<sup>®</sup> manufacturing facilities, as well as their Ralston feedmill, have received the elite ISO 9001:2000 certification. The organization's Quality Management Systems have been certified to the International Standard ISO 9001:2000, as awarded by NSF International.

West Central implemented specific, individual Quality Management Systems (QMS) at each of

the sites in 2007. The organization's quality management system is an internal system, put together by employees to guarantee that the highest standards of quality are met when working with and marketing these products, nationally and internationally. Simultaneously, these standards correspond with those of the ISO 9001:2000. The system provides quality checks for mixing accuracy, ingredient quality, inventory control, internal audits verifying system effectiveness, continual improvement, identifying best practices and meeting customer requirements. Each QMS is designed and tailor made to ensure the highest level of quality for the specific products, SoyPLUS and SoyChlor.

Meeting the ever-growing customer demand for the highest level of quality is vital to the future success of companies in any industry. This certification and QMS gives West Central, SoyPLUS and SoyChlor greater credibility in the dairy industry and provides for consistency in the product. It allows for efficiency increases, greater employee awareness and improved customer satisfaction.

The ISO certification is valid for three years, after which re-certification can be applied for. .

## BEYOND BYPASS

### Living Behavior Affects Cow Health and Productivity

High dry-matter intake is critical to high milk production, but feed intake is only part of the equation. Ohio State University researcher Naomi Botheras, PhD, has conducted a comprehensive evaluation of dairy cattle feeding behavior, and says lying time also is critical to cow performance.

"Cows need to ruminate to fully and efficiently digest their feed, and research has confirmed that they prefer to ruminate lying down," she says. Botheras cites a study that showed overcrowded cows spent significantly less time ruminating during a 24-hour period than did cows that were not overcrowded.

When forced to choose, cows are more likely to lie down than to eat. Research has shown that even after short periods (two to four hours) of deprivation, cows are highly motivated to lie down, showing a significant increase in lying behavior immediately after the deprivation period. This inelastic demand for lying makes it a higher priority over eating after cows have been simultaneously deprived of the opportunity to do both.

"Increased lying behavior also is associated with a reduction in lameness and increased blood flow to the udder, so maximizing lying time may ultimately increase longevity, reduce health costs, increase productivity and improve cow welfare," says Botheras.

[Read the full text of Botheras' article](#) on dairy cow feeding behavior .

## FROM THE MATERNITY PEN

### Balancing For DCAD Improves Value of Corn Silage

Corn silage is an extremely popular forage choice for dairy rations because of its cost

**SOYCHLOR MAKES BALANCING**

efficiency, dry-matter yield per acre, ease of harvest and preservation and ensiling characteristics. However, milk production studies have suggested that dairy rations containing corn silage alone were inferior to those containing at least some alfalfa hay.

University of Maryland ruminant nutrition researcher Richard Erdman, PhD, speculated that the performance drag from corn silage-based diets may have been due to differences in mineral and dietary cation-anion difference (DCAD) concentrations. Erdman and his colleagues conducted a study comparing the production responses of 44 Holstein cows during the first 20 weeks postpartum on three different diets:

1. Corn silage-alfalfa (50:50 forage, DM basis)[CS-AH]
2. Corn silage as the sole forage [CS]
3. Corn silage fortified with mineral supplements (limestone and K<sub>2</sub>CO<sub>3</sub>) to match the mineral and DCAD composition of the CS-AH diet. [CS-DCAD]

## FOR DCAD EASIER

Transition rations can be efficiently balanced for DCAD using the anionic properties of SoyChlor. Unlike anionic salts, SoyChlor is highly palatable, providing hydrochloric acid in a consistent grain mix. Its unique flavor and odor promote dry-matter intake during the critical transition period.

SoyChlor also is low in protein (19%) as recommended for transition rations; low in potassium and sodium to make balancing for DCAD easier; low in phosphorus for safe, responsible ration formulation; and high in beneficial calcium and magnesium.

To learn more about balancing for DCAD with high consistency and palatability, visit [www.soychlor.com](http://www.soychlor.com).

Table 1 shows that milk production, fat and protein percentage, and 3.5 percent fat-corrected milk of cows fed CS-DCAD were equivalent to or greater than that of cows fed CS-AH. There also was a trend (P=08) for increased feed efficiency with CS-DCAD compared to CS-AH and CS.

"These results suggest that differences in mineral and DCAD levels might explain previously reported negative effects of all-corn-silage diets compared to alfalfa-corn silage mixtures," says Erdman.

Item	CS-AH	CS	CS-DCAD	SEM
DMI, kg/d	21.6	22.2	20.9	0.48
Milk, kg/d	34.2	33.8	35.4	1.19
Fat, %	3.84	4.20	3.97	0.115
Protein, %	3.09	3.16	3.14	0.0053
3.5% FCM, kg/d	36.8	38.6	38.9	1.46
FCM/DMI	1.75	1.75	1.90	0.055



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