

Time for Technology

"Water " is the Second "Freedom" of the CowSignals Diamond

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In previous issues, we introduced the "CowSignals" concept and the philosophy that low stress management of the dairy herd provides cows with the "six freedoms of the pasture" illustrated in the "CowSignals diamond". These "freedoms" are unrestricted access to feed, water, light, air, rest and space. Every farmer trouble



The CowSignals Diamond can help identify weak spots in management

shooting their own dairy facilities and management and every advisor doing so for a client, brings their own set of biases to the situation. Applying the mantra of "feed, water, light, air, rest and space" to every assessment prevents tunnel vision and ensures every aspect of meeting the needs of the cow is given consideration.

With the heat of summer upon us, this is a very appropriate time of year to zero in on a few aspects of "unrestricted access to good quality water" and its importance to keeping cows healthy and productive. Some of this we have learned from books and from research, but much of it we have learned from cows, and cows always tell the truth!

As nutrients go, there are likely none more essential than water. Over 85% of milk is water, and if a cow is totally cut off from every source of it, she will perish faster than from lack of any other nutrient. Fortunately, we have an abundant supply of this nutrient, and in most cases it is nearly free for the taking. Providing cows with unlimited free choice access to good quality water is common sense on every farm.

But in our experience, less than half of Canadian dairy cows get fresh water every day. The rest are drinking a bacteria laden mixture of water, cud and crud from troughs that are rarely cleaned. Others are drinking highly mineralized deep well water that can become toxic for fresh cows with a high water intake requirement. In some barns, especially tie stall barns, flow rates are so low that cows become frustrated by the amount of time it takes to satisfy their thirst.

Like the water itself, good water management is usually inexpensive and well worth what little effort it takes. Preventing the build up of dirt in water troughs is usually as simple as dumping and cleaning them on a routine basis. If it is a routine protocol, such as every Monday, Wednesday and Friday, as part of the morning stall maintenance round, it is less likely to be forgotten. And at least once a week, the routine should include a thorough brushing to remove slime and bacteria. Stationary troughs with a sloping bottom and a plug in the end clean easier than tip troughs because there is a flow of water in the empty trough to rinse out the scum on the bottom. Tip troughs need to be tipped a second time after

you brush them out. Many farmers are reluctant to dump and clean troughs because of the volume of water this adds to manure, but this cost is minimal. For an eight foot long by 18 inch wide trough tipping out 8 inches of water puts 50 gallons into the manure pit. Do that three times per week, all year long and you have about 8000 gallons of extra manure to handle. But cows can drink comfortably from a water depth of about 3 inches. With that amount of water the same trough and tipping protocol adds less than 3000 gallons per trough per year. If manure spreading costs \$11 per 1000 gallons that is \$33 per trough per year, or with 30 cows per trough, \$1.10 per cow per year. Reducing the water depth from 8 inches to 3 inches reduces the cost from \$3.00 to \$1.10 per cow per year. While that is a very small difference, it makes sense to do it, but not tipping to save the \$1.10 has to be false economy! We know one farmer who has two small troughs side by side located strategically at each place where his stall cleaning routine takes him out of the cow group. Tipping one over his boots before he moves from the manure alley to the clean feed alley is part of his strategy to provide clean fresh water and keep the feed clean as well.

When you hear cows slurping, you have a "cow signal" that flow rates are too low to meet the cows expectations. Normal drinking speed for a dairy cow is about 20 liters, or 5 imperial gallons per minute, and water lines and pressure systems should be big enough to deliver that flow rate to several troughs at once. Typically cows like to drink 5



Fig. 1 - A tip trough, mounted low to allow drinking in a natural position, and accessible from two sides provides excellent access. Four cows drinking at once may be a sign that low flow rates are restricting access here.

to 10 litres at a time 10 to 15 times per day. At normal drinking speed this only takes about 6 minutes of their day, so low flow rates will not likely limit intake directly.

To assess if water intake is adequate, look at the hair coats of the cows. Shiny smooth



Fig. 2 - This high trough and unnatural drinking position causes unnecessary stress for the cows.

coats are a sign of good water intake. Elastic skin is a good sign as well. Lift up a piece of skin from the side of a cow's neck and it should pop back in place within half a second. If the wrinkle stays there after releasing it, this is a sign of dehydration. What are the eyes telling you? Lively and round big eyes are good signs. If eyes are sunken and deep in the skull it means this cow did not drink today.

Truly inadequate water intake is probably rare, but the importance of good access for the cow makes the water trough an important and interesting place to watch cow

behaviour. In groups with just one trough it is common for the boss cow to spend several hours in front of the drinker to establish and maintain her dominance. Having at least two troughs in every group, and especially in dry cow groups with frequent additions of new cows, is an important step to ensure stress free drinking behaviour. When cows "drink and run" , or drink only from the ends of the tank, this behaviour may reflect too much competition around the trough.

We recommend at least two troughs per group with a total accessible length of 3 to 4 inches per cow. We like to place them in wide open crossovers, on the outside of the turn in the shortest path from the stalls to the manger. This places several troughs against end walls of the barn. In scraper barns you can often recess these troughs back between the corner wheels or manure drops so the drinking cow is partially out of the traffic area. If we think about the natural drinking position for cows, the trough in Figure 2 becomes a very poor choice. The dairyman who owns this barn should be asked to drink a few beverages himself with a rigid object jammed under his throat ! Considering that the cow's body structure is designed to eat and drink at ground level, we think the recommendations of most trough manufacturers still place the water level higher than ideal. We suggest that the ideal height for the edge of the trough is about 20 to 24 inches above the floor, with the water level 4 to 6 inches below the edge. If cows frequently manure in the troughs, it is usually a sign of poor trough placement, such as in narrow crossovers, or behind cows backing away from the manger or backing out of

stalls. Cows like to drink after milking, so placing at least one large water trough in the first large open area available to cows exiting the parlor or the milking robot, is a good idea.

Regardless of the air temperature, cows generally prefer warmer water, ideally around 17 degrees Celcius. While the main role of plate coolers is to reduce energy use in cooling milk, cows definitely prefer the warmer plate cooler water to cold water from the well. Storing this pre-warmed water can be a challenge. We have seen too many storage vessels contaminated with bacteria, delivering stale, smelly water to the troughs. Your cows will thank and reward you for managing these water storage tanks properly. In many cases, that calls for water treatment to control bacteria. Research does show that drinking cold water can help to cool cows during periods of heat stress, so dumping the plate cooler water and substituting cold water directly from the well would be a good strategy on hot days in summer.

While both manure consistency and measuring water intake directly can be cow signals to alert us to low water intake, in our experience the information has to be interpreted carefully within the context of the situation. We have found several situations where cows drinking more than normal, producing quite loose manure, still showed signs of dehydration, low feed intake and low production. In each case these cows were drinking highly mineralized water, often containing minerals such as sulphates at levels of 1000 ppm or higher. These cows drink extra water to help them excrete the excess minerals. That in turn increases their mineral intake, and it becomes a vicious circle. At moderate levels of minerals, it appears that cows are coping, but when heat stress increases water intake further, high producers in these herds suffer more serious consequences.

Observing cow behaviour near the water trough can be an excellent teaching tool. Paying attention to what cows tell us about their water access, especially during times of heat stress, can help minimize the impact of that stress. When good access to water results in happy, healthy cows, the other outcome will be happy farmers, and that is the ultimate goal of the CowSignals concept.