

Technical Bulletin

Suggestions for Creating a Standard Operating Procedure for Checking Close-Up Cow Urine pH

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Introduction: Urine pH monitoring has proven useful in monitoring the use of SoyChlor when balancing close-up dry cow rations for dietary cation-anion difference. If not enough SoyChlor is being fed the urine pH will be too high. If too much SoyChlor is being fed the urine pH will be too low. Other factors such as changes in forages may also affect the urine pH and thus how much SoyChlor is needed.

How to Collect the Samples. Cow urine can be collected by gently stroking a cow just under her vulva. This motion sends a signal to the brain to urinate.

Some Tips:

- Do not collect the samples while others are working around the head (changing ear tags, giving vaccinations, etc.)
- Walk slowly and talk quietly
- Do not excite the cows
- Do not touch the tail. This “worries” some cows and makes them clamp the tail down hindering the urination response
- Wear a plastic sleeve. Sleeves are more slippery than bare hands or latex gloves so they provide a better stimulation and less “drag”.
- Turning on the flush may or may not be useful. Many cows will urinate in response to the water. Sometimes too many cows urinate at once making it impossible to collect all of them. It can be very messy running through the water to make the collection.
- Do not use the first few dribbles of urine. This urine frequently has a higher urine pH than urine from a full stream. It is more likely to be contaminated with manure, or vaginal mucous.

How often should samples be collected? Twice a week is recommended but this may not be practical on all dairies depending on the facilities (lock-up facilities, etc.) and labor situation. It should be done a minimum of at least once a week and then more often during major feed changes or during times of increased fresh cow problems.

How many samples should be collected? 8-10 samples should be adequate. Once a technician gets good at collection the samples should take less than 10 minutes to collect. It is probably better to get 4 samples twice a week than 8 samples once a week.

How long can samples be stored before testing for pH? Within an hour is probably best but the changes that occur by leaving the samples overnight are small. Samples to be analyzed twelve (12) hours or more after collection should be stored in a refrigerator.

Is time of day important? Some research has indicated that time of day may be important but these studies were done feeding the cows all their daily anionic salts either once or twice a day. The recommendation has been made by some consultants to only check cows 4 – 8 hrs after feeding. Based on practical experience, the influence of time of day is negligible when cows are fed a TMR either once or twice daily. See attached abstract of a recently completed study. It is recommend that the samples be collected when it is most convenient for the farm personnel and least obtrusive to the cows. This is usually at feeding when the best lock-up occurs. (Figure 1.)

How long do cows need to be on SoyChlor before I can check their urine? Two to three days is all it takes (Figure 2.) On the other hand it also takes two-three days off the diet for the urine pH to rise and for the cows to be at an increased risk of milk fever.

Urine pH vs Hours Since Feeding

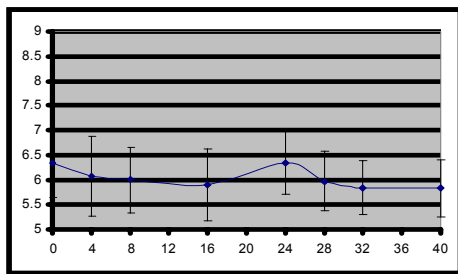


Figure 1.

Urine pH Drop after Moving to Close-up Pen

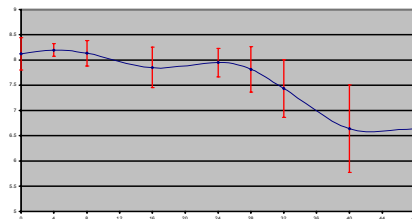


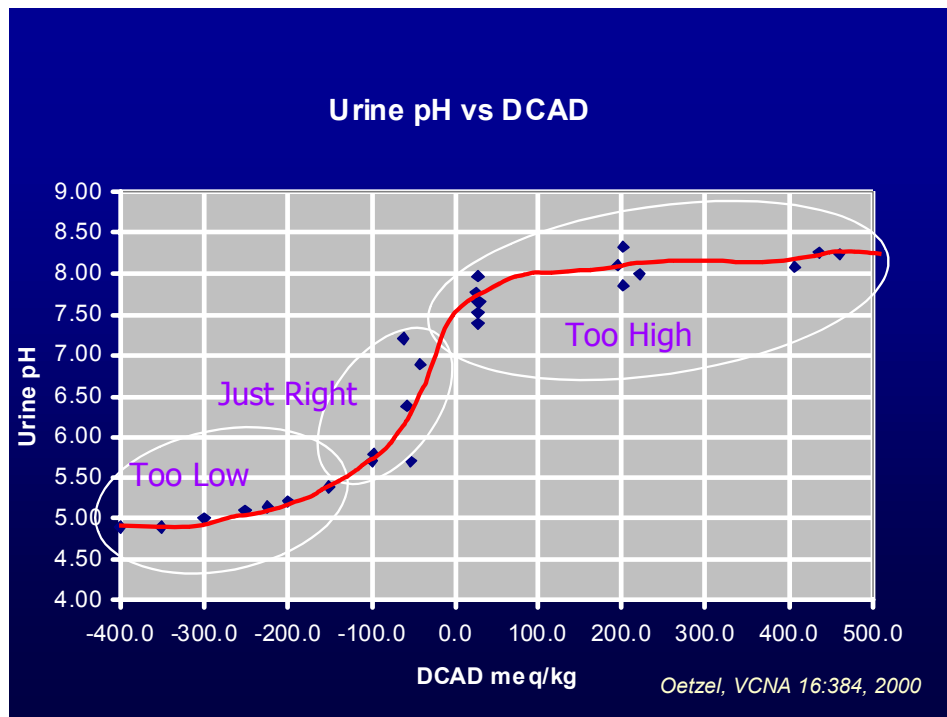
Figure 2.

What is the optimum pH for preventing milk fever?

- 8 – 8.5 Too high. This is “normal” cow urine and we have failed to acidify her blood or urine. These cows are at risk of milk fever.
- 7 – 8 These cows are on a DCAD diet but need more SoyChlor to get them in the right range.
- 6 – 7 Optimum.
- < 6 Too much SoyChlor is being fed. Some should probably be removed.
- < 5.5 Way too much SoyChlor is being fed. Cows are at an increased risk of fresh cow metabolic problems. Heat Stress may be a bigger issue for these cows.

You may hear other experts use the following guidelines for the optimum range: 5.5 to 6.5, 6.0 to 6.5, 5.8 to 7.3, 6.0 to 7.0 for Holsteins but 5.5 – 6.5 for Jerseys. An understanding of how urine pH changes with amount of anions being fed helps clear up why there may be such a large variation in recommendations and helps avoid over interpreting the results and micromanaging the feeding program.

The graph below was modified from a study put together by Gary Oetzel showing how urine pH changes with changing DCAD.



(Original graph by Oetzel, modified by Phillip Jardon)

Note that in the just right range more variation in the samples is expected because it is at the steepest part of the curve.

Not all cows “read the book” and in a sample of 8 cows there may be one low (let’s say 5.2) and one high (7.6) but most of the cows are in the optimum range. This is OK.

If there are a lot of extremes—Cows in low 5’s and in the 8’s there may be sorting occurring.

If all cows are low, let’s say all below 5.5 or very many are below 5.0 this indicates we are way to the left of the graph and less anions should be fed.

If all cows are high, let’s say above 7.5 or very many above 8 then we are way to the right of the graph. This may be due to not feeding enough anions or from feeding too many cations (sodium and potassium). The latter may happen from accidentally feeding buffers or from feeding the wrong forage.

Examples of DCAD Failures:

#1 (On Farm Mixing Error) This dairy had a sudden increase of milk fever cases. After checking the urine and finding all the cows were above 8, the owner interviewed the feeder and discovered that the wrong mineral had been fed. It only took two days for the urine pHs to drop to the correct range and for the problem to disappear.

#2 (Feed Mill Mixing Error) This dairy had recently started to balance for DCAD but had not seen a decrease in milk fever. After checking the urine and finding all the pHs to be above 8, the nutritionist discovered that the anion source had not been added to the grain mix at the feed mill.

#3 (Rations Changes) This dairy had an increase in milk fever cases. After checking the urine and discovering that the pHs were too high, the nutritionist reexamined all the feeds and discovered that the mineral content of the forages and by-products had changed. The ration was reformulated and the problem solved.

#4 (Retained Placentas) This dairy had an increase in retained placenta at the same time there was increase in urine pH to around 8. The problem only lasted about one week. The dairyman believes the problem was caused by a combination of feeding the wrong hay and a mistake in the premix. When the urine pH's came down to 6-7 the problem disappeared. It is likely that the RPs were caused by subclinical milk fever—when the calcium level is not low enough to make the cow go down with obvious milk fever but low enough to affect her in other less obvious ways.

#4 (Overfeeding) On this dairy the feeder had been caught not feeding the anion source causing the dairy to have high urine pHs and milk fever cases. The feeder overcorrected and fed too much of the anion source. The urine pHs were very low. All the cows were below 5.5 and some were even below 5. Two close-up cows died during a period of severe heat stress and there was an increase in fresh cow metabolic problems. The problem was solved by decreasing the amount of anions being fed and educating that feeder that just because a little was good did not mean that a lot was better.

#5 (Cow Movement) On this dairy cows were moved to a maternity pen a day or two prior to calving. Since this is difficult to determine accurately, some cows would be in maternity pen for up to a week. Urine pH was in the right range in close-up pen but many of the cows in the maternity pen had high urine pH values. The problem was fixed by changing the feed in the maternity pen from the fresh ration to the close-up ration.

Summary: The use of urine pH can be very useful in monitoring SoyChlor programs. When interpreting the results take all the dietary factors into consideration. Avoid over interpreting the results. If you have any questions please contact us at (800) 843-4769.



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