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Newsletter Editors:

Jennifer Heguy

UCCE Dairy Advisor
Merced/Stanislaus/San Joaquin
jmheguy@ucdavis.edu
209-525-6800

Dr. Noelia Silva-del-Rio

Dairy Production Medicine
Specialist, VMTRC
nsilvadelrio@ucdavis.edu
559-688-1731

Monitoring your DCAD Program - Taking Urine Samples

*Rosalía López-López, DVM &
Noelia Silva-del-Río, UCCE Dairy Herd Health Specialist*

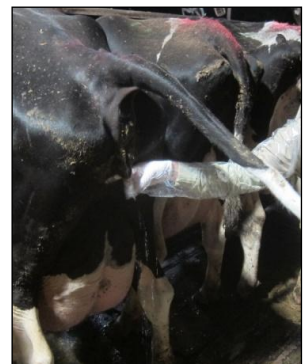
When calcium demand for colostrum and milk production exceeds the calcium available in plasma, cows might suffer milk fever or hypocalcemia. This peripartum metabolic disorder affects mostly high producing cows in their third or greater lactation. Jersey cows show greater predisposition to hypocalcemia than Holstein cows. The prevalence of clinical hypocalcemia has been reported to be 5% whereas subclinical hypocalcemia affects approximately 50% of all multiparous cows.

One of the strategies used to prevent clinical and subclinical hypocalcemia in dairy cows is to feed anionic salts in close-up diets [dietary cation anion difference (DCAD)]. Increasing dietary anions (Cl^- and SO_4^{2-}) induces a compensated metabolic acidosis which increases tissue responsiveness to parathormone (PTH). This hormone enhances bone resorption and intestinal absorption of calcium.

Using total mixed rations (TMR) ad libitum is the best method of delivering anionic salts without depressing feed intake. However, correctly mixing anionic salts into the close-up TMR can be challenging. Urine pH is a good indicator of blood pH. Thus, in order to assess if the DCAD program is working, we can monitor urine pH of close-up cows. Urine pH should be monitored on **8 to 10 cows** from the close-up pen, and preferably, it would be done **twice a week**. If cows are fed TMR, changes in urine pH relative to time of feeding will be negligible. Urine samples should be collected midstream to avoid alkalinity from vaginal secretions

or contamination with manure. Below are some tips to quickly obtain urine samples:

- Avoid sampling when farm personnel is working with close-up cows (pen moves, checking ear tags, giving vaccines, etc.).
- Approach cows slowly without scaring them.
- Do not hold the tail while stimulating urination
- Massage the vulva by stroking from the rear udder attachment to the lower vulva. Use one hand and avoid placing your second hand on the cow.
- To reduce friction during the stroking, wear plastic sleeves instead of latex gloves or bare hands.



The success of a DCAD program can be easily evaluated by monitoring urine pH. In Holstein cows, urine pH values should be between 6.2 and 6.8, and for Jersey cows between 5.8 and 6.3 (with DCAD supplementation).

If the urine fails to be acidified, evaluate if the inclusion rate of anionic salts in the diet is adequate, and that the preparation and delivery of the ration is done properly.

The Importance of Dry Matter: Tips for Feeders and Dairy Producers

Jennifer Heguy, UCCE Merced, Stanislaus & San Joaquin Counties &
Ed DePeters, UC Davis – Department of Animal Science

Dry matter (DM) is what remains when water (moisture) is removed from a feed. In the example corn silage report, you'll see DM is listed at 35.9% (for simplicity, we'll round to 36% DM). Another way to think about the concept of DM is: for every 100 lbs of this corn silage that is fed, 64 lbs of it is water.

Knowing the DM of a feedstuff is important for a number of reasons, including:

- **Buying forages.** When purchasing feeds we don't want to pay for excess water.
- **Ensiling forages.** Ensuring proper moisture of forage at the time of ensiling is critical to putting up a quality product.
- **Making hay.** We want to minimize mold growth and heating.
- **Comparing feedstuffs.** It's imperative that we compare the composition (nutrient and energy) of different feedstuffs on a DM basis. Basically, DM basis puts everything on an equal basis for comparison.
- **Formulating rations.** Water is an essential nutrient, but water does not contain energy, which is required to make milk (you'll notice in the report that the components are all reported on a percentage DM basis).
- **Mixing rations and feeding the herd.** This will be the focus of the rest of the article.

CHEMISTRY ANALYSIS RESULTS			
Dry Matter		35.9	
Moisture		64.1	
PROTEINS		% DM	% CP
Crude Protein		7.7	
Adjusted Protein		7.7	
Soluble Protein		5.07	66.2
Ammonia (NPN)			
ADF Protein (ADICP)		0.79	10.3
NDF Protein (NDICP)		1.11	14.5
Rumen Degr. Protein		6.368	83.1
Rumen Deg. CP (Strep.G)			
FIBER		% DM	% NDF
ADF		29.19	68.2
NDF		42.80	
aNDFom			
NDR (NDF w/o sulfite)			
peNDF			
Crude Fiber			
Lignin		3.44	8.04

So as a feeder or a dairy producer, why is it so important to understand DM and measure it correctly? Because while it's very important to provide cows with clean, readily accessible water, in terms of feeding cows, water does not contain energy and energy is essential for milk production.

Let's look at an example:

Your nutritionist formulates a ration that calls for 6,000 lbs of as-fed corn silage to be added to the mixer wagon. The last DM analysis shows the corn is 36% DM (or 64% Moisture). How many pounds of DM is that?

$$6,000 \text{ lbs} \times 0.36 \text{ DM} = \underline{2,160 \text{ lbs DM}}$$

What if the corn silage is now wetter than the original silage sampled so that the DM is actually 30% DM (or 70% Moisture)?

$$6,000 \text{ lbs} \times 0.30 \text{ DM} = \underline{1,800 \text{ lbs DM}}$$

Because we didn't correct the DM, we've cheated that particular ration of 360 lbs DM from corn silage. At 30% DM, the amount of silage going into the mixer wagon should have been:

$$2,160 \text{ lbs DM} \div 0.30 \text{ DM} = 7,200 \text{ lbs of as-fed corn silage}$$

In simple terms, because we shorted the mixer wagon of corn silage DM, the ration is no longer balanced for the nutrient and energy needs of the milk cows. If the ration is shorted 360 lbs DM of corn silage, there is less crude protein (CP) than formulated. Basically, you thought you were adding 166.3 lbs CP (2,160 lbs DM x

0.077 CP) but only added 138.6 lbs CP (1,800 lbs DM x 0.077 CP). There is also less energy fed than formulated. These differences, over some time period, might impact milk yield and even body condition and reproduction.

Troubleshooting DM results

Sometimes, a DM result just doesn't make sense with what you see at the silage structure or with a previous DM determination. This can happen with on-farm methods as well as samples sent to a commercial lab. Here are a few areas to troubleshoot when presented with inaccurate DM results:

1. Do you have a good sample?
 - Is your sample representative of what you'll be feeding? Be sure to take multiple grab samples of the silage. Mix these grab samples in a bucket, and then subsample to analyze for DM. Do not take the samples directly from the structure face, instead, remove the forage from the face (with a front-end loader, for example), move a safe distance from the face, and sample the removed forage. It's best to do this with forage freshly removed from the face.
 - How was your sample handled? If the sample is not analyzed right away, store your sample in a cool, dry place. Carry an ice chest or refrigerate your sample to store for later use.
2. Is your scale working properly?
 - Check the batteries, and consider buying an inexpensive calibration weight kit.
3. When in doubt – compare!
 - Split your sample and run DM multiple times to see if your results are in agreement.
4. Train, train and re-train!
 - Having a written protocol for sampling, storing, and analyzing DM on-farm is important to obtain accurate results. Check in on the person responsible for measuring DM to be sure he understands the protocol, has properly working equipment, and doesn't have any questions or concerns.

Current California methods

In a 2013 California survey we conducted, most dairies were checking the DM of corn silage one to three times per month (58% of respondents). About 28% of dairies checked the DM one to three times per week, with the remaining 14% of dairies measuring DM one to six times per year. Half the dairies checked the DM on farm, and the other half sent samples to a commercial lab for DM analysis. The most popular on-farm method was the koster tester (76%), with fewer dairies using a microwave method (21%).

Dry matter is an important measurement. Wet feedstuffs, like silages, are likely to fluctuate in DM content and should be checked regularly. Number of cows fed, structure size, past history, etc., will all dictate how often to sample for DM. Talk with your nutritionist to set up a sampling schedule for DM determination on your farm.

***Salmonella* in dairy cattle**

Dr. Patricia Blanchard, California Animal Health and Food Safety Laboratory

Salmonella can cause diarrhea in dairy cows and calves. In calves it most often affects animals under 30 days of age, except for *Salmonella* Dublin which can cause diarrhea, fever, respiratory signs and generalized infection in calves up to 6 months of age. In dairy cows, diarrhea due to *Salmonella* most often occurs in the first 7 days after freshening. Fevers may be present and sometimes blood is seen in the feces. The most common types of *Salmonella* causing postpartum diarrhea are group B (usually *S. Typhimurium*) and group C2 (usually *S. Newport*). Other types may be seen, but they seem to cause milder infections or the cow may just be a transient carrier or a long term carrier of *S. Dublin* without disease.

Why does *Salmonella* affect recently fresh cows? Like all infectious agents, there is a balance between the host (cow), the organism (*Salmonella*) and the environment. When the balance shifts, the organism can take advantage and cause disease. The host factors in fresh cows include a normal depression of the immune system that occurs at freshening. The immune system is impacted by hormone and physiologic changes and stresses from new social interactions and housing/environment changes. Changes in feed, and how well the transition rations are working, plays a role as feed changes can cause the normal protective bacteria in the intestine to shift, creating an opening for *Salmonella* to become established.

The environment is often looked at in order to find out where the *Salmonella* is and how it is spreading. Water troughs have been the most common place the California Animal Health and Food Safety Laboratory has isolated *Salmonella*. Close up, maternity and hospital pen troughs have all been implicated. Contaminated equipment or boots brought into a maternity pen (such as a calf cart or a worker who has just been in the hospital pen) can be a source. Fresh cows that are housed in a hospital pen with sick cows can also be exposed to high numbers of the organism. Since a cow with diarrhea from *Salmonella* sheds billions of organisms into the environment, flush alleys and recycled lagoon water could have high levels of organisms - so cows drinking that water become infected. The reason cows later in lactation rarely show diarrhea, even if *Salmonella* is circulating in the flush alleys, is because they are not experiencing the same immune system challenges, feed changes and other stresses as a fresh cow. One study found a source of an uncommon type of *Salmonella* to be fat sold from one feed company to multiple mills. Another found low levels of *Salmonella* on a crop that was sprinkler irrigated with lagoon water. *Salmonella* has sometimes been isolated from feed on dairies, but consideration must be given to how the sample was taken. Was the feed leftover on the bunk or apron, or collected from the ground level of piles where cow manure, contaminated water or rodent droppings may be present? Perhaps the feed wagon became contaminated from feed on the ground.

Preventing diarrhea due to *Salmonella* in dairy cows requires focusing on environmental factors, feed and water trough management, sources of potential spread and fresh cow management to reduce factors that predispose fresh cows to developing diarrhea.

Dairy Students Rise to the Challenge

Russ Hovey, UC Davis – Department of Animal Science

Despite some challenging conditions for dairying, one bright spot recently showed itself – a commitment of college students to the industry and their enthusiastic passion as future professionals in the field. Dairy Challenge is a national intercollegiate contest designed to provide students with real-life management and decision-making scenarios aimed to develop the next generation of industry professionals.



From February 26-28, a record 83 college students from across the Western US and Canada descended on the College of Sequoias (COS), Tulare, for the Western Regional contest. Participating schools were University of Alberta, University of Idaho, Washington State University, UC Davis, CSU Cal Poly-SLO, CSU Fresno, Utah State University, Texas A & M, Merced Community College, and Oregon State University. Participating students are from all walks of life, and are enrolled in animal or dairy science programs at their school. The Regional contest is a prelude to the National Dairy Challenge held in Syracuse, NY from April 9-11 that several western teams participated in.

During the regionals, students were assigned to aggregate teams and got to know each other through a unique team-building exercise that generated tricycle donations to local charities. On the first evening, each team received production and management records for the farm of Jay teVelde and Tyler VanGrouw. The next day the students were let loose on farm where they strategically went about analyzing all aspects of the operation from top to bottom, then had the chance to ask further questions of their clients. Meanwhile, the coaches

worked hard taste-testing the products on offer at Top O' the Morn farms! Once back at COS, the students then formulated their conclusions and recommendations, and prepared for the next day when they presented their team's findings and recommendations to a panel of judges made up of a dairyman, a nutritionist, a veterinarian, and a financier.

The students left COS with many new skills – they made new professional contacts, reinforced learned theories on dairy management, and met new and future peers. Of course, the event was a real testament to the massive investment by the many committed industry professionals, alumni, sponsoring companies and academic advisors for which, without their help, the event would not have been possible. Thank you to all the supporters!

More information about Dairy Challenge, including pictures from the Western Regionals, can be found at <http://www.dairychallenge.org>, or on Facebook. Also, something to keep in mind - the National Contest will be hosted in California in 2017 – your support and interest is welcome!

Which Lab Should I Use for My Forage Analysis?

Dr. Deanne Meyer, UCCE Waste Management Specialist

Choppers are going gang busters trying to get winter forage harvested quickly so corn may be planted. It's an appropriate time to brush up on compliance sampling needs to meet the Central Valley Regional Water Quality Control Board's monitoring requirements. The first step is to identify a proper laboratory and the second step is to be sure the lab is using the right methods. Labs participating in the various programs will receive documentation indicating that they are participants. Check with your lab to be sure it's able to supply you with information that meets your compliance needs. Remember, compliance samples of forage should be taken as material is brought to piles from the field and not from ensiled material ready for feed out.

Shortly after the General Order was adopted the Regional Board posted a sampling and analysis document online. Included in this document are the requirements for laboratory credentials and methods of analysis. Information in “ “ is directly from this document.

http://www.waterboards.ca.gov/centralvalley/water_issues/dairies/general_order_guidance/sampling_analysis/sampling_and_analysis_21feb08.pdf

“Laboratory analyses of process wastewater applied to land application areas shall be conducted by a laboratory certified that is either accredited for such analyses by the California Department of Health Services or that is participating in the manure analysis proficiency (MAP) program. These laboratory analyses shall be conducted in accordance with the Title 40 Code of Federal Regulations Part 136 (Guidelines Establishing Test Procedures for the Analysis of Pollutants), MAP program-approved methods or other test methods approved by the Executive Officer.” A list of MAP participants is available at

<http://www2.mda.state.mn.us/webapp/lis/maplabs.jsp> . A list of ELAP certified labs (waste water) is available at http://www.waterboards.ca.gov/drinking_water/certlic/labs/documents/elap_certified_waste_water.pdf

“Manure analyses shall be conducted by methods utilized by the Manure Analyses Proficiency (MAP) Testing Program or accepted by the University of California and laboratories participating in the MAP Testing Program or other programs whose tests are accepted by the University of California.” UC methods were developed in response to the General Order. They are available at http://anlab.ucdavis.edu/dairy-general-order-compliance-2013-nutrient-management-plan/uc_analytical_methods.pdf

“Plant tissue analyses shall be conducted by: methods utilized by the North American Proficiency Testing (NAPT) Program or accepted by the University of California; and laboratories participating in the NAPT Program or other programs whose tests are accepted by the University of California.”

“Analyses of soil shall be conducted by: methods utilized by the North American Proficiency Testing (NAPT) Program or accepted by the University of California; and laboratories participating in the NAPT Program or other programs whose tests are accepted by the University of California.”

A list of laboratories participating in NAPT is available <http://www.naptprogram.org/about/participants> .

I've had calls and emails from individuals wanting to use labs involved in the National Forage Testing Association process. This program does not include mineral analyses in its testing and that is why it was not listed by the Regional Board as a testing program for the analytes needed for nutrient management. The NIR analysis is appropriate to determine some parameters in a pure forage sample when the data are used for ration formulation. However, it isn't reliable for all parameters needed for compliance purposes. It's also not reliable for mixed forage types or something with lots of weeds. As a result of the non-homogeneous material for most winter forages, some corn silages and some alfalfa, only wet chemistry methods are included in the California Analytical Methods Manual for Dairy General Order Compliance – Nutrient Management Plan Constituents, University of California, Davis Analytical Laboratory. http://anlab.ucdavis.edu/dairy-general-order-compliance-2013-nutrient-management-plan/uc_analytical_methods.pdf . Although used for energy determination, NIR is inappropriate for nutrient management purposes.

Drought and Nutrient Management

Dr. Deanne Meyer, UCCE Waste Management Specialist

Here we are again after yet another dry year. A few important tips to remember when dealing with nutrient management this spring. You'll want to work with your CCA (certified crop adviser) to be sure the **nutrient budget** is up to date for your current cropping pattern. You'll especially want to be sure there is sufficient water for the acres you plant. Keep in mind that almost all dairies under the General Order are also in the representative groundwater monitoring program. To remain in the program, nutrients need to be applied to meet identified needs (as per your budgets).

As the Regional Board staff are out doing inspections they'll focus on budgets and manure applications to fields where crops are growing. As a refresher ... **Your Nutrient Budget** identifies for **each crop in each field how much** Nitrogen (N) to apply, **when** to apply, **source of N** (manure, fertilizer, irrigation water), maximum period of time anticipated between application events (**storage needs**), **method of manure and process wastewater application**, and review of soil and crop tissue analyses every 5 years by an agronomist if phosphorus and/or potassium applications exceed crop removals. Budgets also reflect **estimated crop yield**. **BE SURE TO EVALUATE YOUR NUTRIENT BUDGET AND MODIFY AS NECESSARY.**

MODIFY YOUR NUTRIENT BUDGET (GET a Certified Crop Adviser Signature) if you change crops grown (including fallowing land), have a change in yield expectations, or change your source of irrigation water. Remember, the Nutrient Budgets are meant to be modified regularly. If your budget was signed in 2010 and it hasn't been updated, odds are pretty good that it may not represent your current cropping practices and you could have a challenge during a Regional Board inspection. Inspectors are looking very closely at Nutrient Budgets when they inspect dairies. What crop should be in the ground? When was it planted? What is the expected date for harvest? How much nitrogen has been applied? Current violation notices to dairy operators who applied manure without a growing crop have included the need to remove the manure from the field and potential fines. Keep in mind the Regional Board is contemplating if dairies who over apply manure should install their own groundwater monitoring wells (and not be allowed to participate in the representative program).

Modify manure applications. Evaluate your Nutrient Budgets to identify if you should modify manure applications. If you estimate a change in crop N uptake/removal, have nitrate available in groundwater irrigation sources, or fallow land, manure applications will need to be adjusted in order to accommodate changes in anticipated applications or yields.

If you are manure rich and planted acreage poor ... manifest as much solid manure off-site as possible. Be sure you distribute liquid manure according to your nutrient budget. Carefully evaluate where you will get your

greatest yields (especially if you have some poorer performing fields) and re-evaluate and apply liquid manure and irrigation water accordingly.

Grain/Alfalfa Field Day

May 12th - 8:00am - 4:30pm
UC Davis Agronomy Headquarters
Hutchison Road, ½ mile west of Route 113 in Davis.

8:00am - 12:00pm: Grain Field Day (wheat, barley, oats, triticale)
12:00pm: Barbeque Lunch (sponsored by California Crop Improvement Association)
1:00pm - 4:15pm: Alfalfa/Forages Field Day (alfalfa, sorghum, corn, irrigation)

For details (complete program coming soon) see: <http://agric.ucdavis.edu/>

Dairy Genomics Workshop

April 30th – 10:00am – 2:30pm
UC Davis Veterinary Medicine Teaching and Research Center
18830 Road 112, Tulare, CA 93274

Who should attend? Dairy producers and managers, veterinarians, allied industry, and extension faculty.

Experience with genomics is not required.

Full agenda can be found at: <http://cekings.ucanr.edu/files/208358.pdf>

To reserve a space, please contact Carol Collar at:
(559) 582-3211 or ccollar@ucdavis.edu

