University of California
Agriculture and Natural Resources

California Dairy Newsletter

Vol. 6, Issue 3 July 2014

In this Issue…

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

Buying or Selling Corn Silage this Summer?

Jennifer Heguy, UCCE Merced, Stanislaus & San Joaquin Counties

With talk of $75-$95 corn silage this summer, now is a good time to start thinking about your silage goals. Traditionally, corn silage is purchased on a 70/30 basis; that is 70% moisture and 30% DM.

Let's assume we're buying a field for $75/ton. What happens when the corn silage is delivered at 28% DM, is the value still $75/ton? What if it's delivered at 32% DM? Below is an equation that can be used to correct the purchase price for DM:

$$\frac{\textbf{Actual DM \%}}{\textbf{30\% DM}} \times \textbf{\$/ton} = \textbf{\textit{Corrected} \$/ton}$$

Examples:

So, at **28% DM**, the purchase price would be: 28/30 x $75/ton = **$70/ton**

And, at **32% DM**, the purchase price would be: 32/30 x $75/ton = **$80/ton**

It's important to remember that as corn matures (DM increases) and starch content increases, fiber quality declines. This trade-off between starch content and digestibility of forage will affect how the silage is incorporated into rations. It's also a prime example of why it's imperative to talk with your nutritionist about your silage goals before making a decision to harvest at a certain DM.

How we sample a field of corn silage for DM adjustment can also have us paying too much or charging too little for corn silage. Sample the field often for the best results. When we followed larger fields of corn silage, ones that took 10 or more hours to harvest, taking an hourly sample was the best way to estimate DM of the entire field. When fields are on the small side, or take less than 10 hours to harvest, sampling more frequently may be warranted. Taking 10 consecutive samples of truckloads dumped at the structure yielded better results on the smaller field (~23 acres). In the table below, you can see three fields of corn silage that we followed, and what the *extreme prices* would be based on sampling method at $75/ton corn silage.

Average DM	23%		28%		30%	
Corrected $/ton (assuming $75/ton)	$57.50		$70		$75	
Tons Harvested	1406		673		989	
Acres Harvested	+/- 50		+/- 23		+/- 50	
			$/ton			
	Min	Max	Min	Max	Min	Max
Single Sample	$45	$69	$63	$82	$62	$88
10 Consecutive Samples	$53	$61	$68	$73	$71	$78
Hourly Samples	$55	$59	$67	$74	$72	$76

To see more details regarding this work, visit: http://cestanislaus.ucanr.edu/Dairy_Science/UCCE_Silage_Day_2014/

Managing Nutrients During Drought

Dr. Deanne Meyer, UCCE Livestock Waste Management Specialist

Believe it or not dairies in the Central Valley have been operating under the General Order for Waste Discharge Requirements for seven years now, since May, 2007. Many producers continue to make improvements in their production facilities as well as their liquid manure distribution system. These improvements aid producers in implementing their Nutrient Management Plan (NMP). It's essential to review key points of your facility's NMP given the current drought conditions.

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 Advisor 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 much more closely at Nutrient Budgets when they inspect dairies. Expect violations and potential penalties for farming practices that do not reflect the existing Nutrient Budgets.

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.

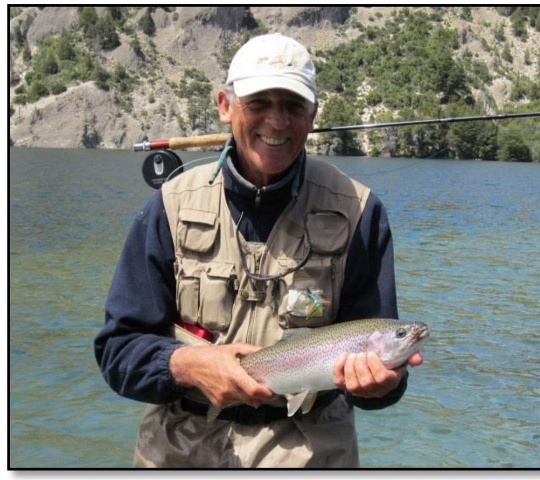
SAMPLING AND ANALYSIS PLAN. Remember to review your plan. Plans should be updated and reflect changes in the Monitoring and Reporting Program (MRP) of the General Order in 2011. Keep in mind soil analyses are every five years or a fifth of your total acreage each year (rotating each year such that all have been sampled once within a five year period).

Betsy Karle Hired as UCCE Dairy Advisor in the North State

Betsy Karle served as dairy program representative in Glenn and Tehama Counties since late 2007. As of June 25, her position is Area Dairy Advisor (covering Glenn, Butte, Tehama, Sutter, Yuba and Shasta Counties) and UCCE Director for Glenn County. Though her dairy program will not change dramatically, we look forward to having Betsy on the team in this new role. Betsy grew up on her family's Sonoma County dairy, playing an active role in the management of the herd and raising her own string of registered Holsteins. She earned her M.S. in agricultural ecology and B.S. in agricultural systems and environment from UC Davis. Betsy can be reached at 530-865-1156 or bmkarle@ucanr.edu.

Dairy Advisor Alejandro Castillo Retires After 12 Years of Service with UCCE

After 12 years with the University of California Cooperative Extension, Dr. Alejandro Castillo has retired from his position as Dairy Advisor serving Merced County. Prior to joining UCCE, Alejandro came from a research and extension job in Santa Fe, Argentina. His work in California focused on dairy cow nutrition and environmental concerns, nutrient balances and nutrient excretion, with special attention to nitrogen and minerals. "I do want to thank the many dairy producers in Merced County and my UC colleagues who have helped me with my extension and research program," Castillo said. "Their help was critical to doing my part for the future of our dairy industry."



Although entering retirement, Alejandro is not completely leaving UC or the dairy industry. Alejandro was awarded emeritus status from UCCE, and will remain active in the industry as a part-time consultant for an international tannins company. You can continue to reach Alejandro via email at arcastillo@ucdavis.edu.

Thank you, Alejandro, for your dedication to the producers of Merced County and the California dairy industry.

Jennifer Heguy, UCCE Dairy Advisor, Now Serving Merced County

With Alejandro Castillo's retirement, Jennifer Heguy has taken over the dairy program in Merced County. Jennifer also serves Stanislaus and San Joaquin Counties, and can be reached at: (209)525-6800 or jmheguy@ucdavis.edu.

ABCs of Forage Analysis – What is Energy?

Dr. Ed DePeters, UC Davis & Jennifer Heguy UCCE Merced, Stanislaus & San Joaquin

Energy content of feedstuffs is an important attribute because energy intake of dairy cattle impacts milk production, growth, reproduction, and health. High quality forage is high in energy, ***but what exactly is energy?***

Energy is a difficult entity to describe. You can isolate protein, for example casein from milk, and you can hold casein in your hand and you can see the casein protein. The same is true for fiber; we can extract the fiber from alfalfa hay using the NDF (neutral detergent fiber) method and see the fiber. However, we cannot isolate energy, we cannot see it, and we cannot hold it. *But we can measure the energy content of feedstuffs.*

To measure energy, we first must be able to define what energy is. By physical definition, energy is the ability to do work – it is the movement of a force through a given distance. For our purposes, energy is used to drive the various metabolic pathways in the body of dairy cattle to synthesize milk and meat for productive purposes.

Energy is often inaccurately referred to as a nutrient. There are six nutrients: water, proteins, carbohydrates, lipids, minerals, and vitamins. ***Energy is not a nutrient, but a property that some nutrients possess.*** For example, proteins, carbohydrates, and lipids can be metabolized in the body of animals to yield energy. The highest energy yielding nutrient is lipids. The energy content of nutrients is the basis for our dairy feeding systems as well as the system used for humans.

The NRC (National Research Council) for dairy cattle uses the Net Energy (NE) system to determine the energy content of feedstuffs and the energy requirements of animals. The NE system attempts to measure the sources of energy loss in the dairy cow. Basically, the NE system is an energy balance system. Let's take a look at the different fractions of the NE system. Refer to **Table 1** to see the differences between energy values of high quality versus low quality alfalfa hay in our example.

Gross Energy – this is the total potential energy in a feedstuff. Gross energy is also called **Intake Energy**. You'll notice that the gross energy contents for the high and low quality alfalfa hays are similar. This is because they are quite similar in content of proteins, lipids, and carbohydrates. Gross energy doesn't tell us the complete story of how the animal will utilize the feedstuff. The availability of the Gross Energy to the animal is what is important.

Digestible Energy – this is the energy remaining after some energy is lost in feces. The amount of energy lost in the feces of the high quality alfalfa hay is less than the low quality alfalfa hay. The high quality alfalfa hay has less lignin and less fiber so it is more digestible than the lower quality alfalfa hay.

Metabolizable Energy – this measure takes into account the amount of energy lost in the urine and gas of the animal. Basically, Metabolizable Energy is the amount of energy in a feedstuff that is available for productive purposes (e.g. synthesis of milk and meat).

Net Energy – this is the amount of energy in the feedstuff that is retained in the animal in the form of maintenance of body tissue and synthesis of product (e.g. milk and meat). The energy lost as heat associated with fermentation and nutrient metabolism are accounted for. Net Energy is our most accurate estimate of energy content of feeds. The largest loss of energy occurs in the loss of fecal energy. So feedstuffs with high digestibility, for example high quality corn silage, have high energy compared with lower quality forages such as straws. Another example of digestibility would be the energy content of BMR corn silage, which is generally higher than conventional corn silage because BMR corn silage is more digestible (lower lignin in the stalk and higher fiber digestibility).

Table 1. Energy values of high and low quality alfalfa hay.

	High Quality Alfalfa	Low Quality Alfalfa
	Mcal/kg	Mcal/kg
Gross Energy (GE)	4.40	4.40
Digestible Energy (DE)	2.91	2.65
Metabolizable Energy (ME)	2.49	2.22
Net Energy (NEL)	1.50	1.35

Data are from the 1989 NRC for Dairy Cattle

Predicting the energy content of feedstuffs is an essential step in preparing diets for dairy cattle. But just as important is how the skilled nutritionist on your dairy uses the energy values of each individual feedstuff to formulate a diet. This requires knowledge of many factors, including the rate of digestion in the rumen as well as the rate of passage from the rumen, that impact fermentation balance and the digestibility of nutrients. The diet must provide enough available energy to the lactating dairy cow to support maintenance of the animal as well as productive functions including the synthesis of milk and meat, the support of the immune system, and the development of the fetus.

Soaker Nozzle Type Affects Water Use, But Not Cow Cooling

Jennifer Chen and Dr. Cassandra Tucker, UC Davis

Heat stress costs US dairy producers as much as $1 billion annually. These costs come in many forms. When cows are hot, they eat less, milk production drops, and pregnancy rates fall. In extreme cases, cows can even die in hot weather. Dairy producers clearly recognize the importance of managing the environment to reduce heat stress. A USDA survey found that 94% of US dairies use either shade, fans, or sprinklers (soakers or misters).

When it comes to deciding how to reduce heat stress, soakers cool cows more efficiently than shade alone. The intermittent spray from soakers draws heat away in 2 ways: water dripping off the body, and evaporation from wet skin and hair. Although soakers are effective for cooling, they use potable water – a limited resource. In light of the ongoing drought, conserving water becomes more important. So, how much water should soakers use?

A common recommendation for how much water to apply each time the spray is activated is that the hair coat should be wet through the skin, but excess water should not drip from the coat; we've found that it takes about 1 gallon to wet a cow in such a manner. However, there is little science to support this recommendation. In practice, many operations – including the UC Davis dairy – use more than that: last summer, we found that Central Valley drylot dairies used between 1.2 to 11.4 gal/h/cow.

In order to determine how much water is needed to cool cows, last summer, we compared soakers that delivered 2.6 gal/h/cow (TeeJet TF-VP2 nozzle) vs. 9.8 gal/h/cow (TF-VP7.5) vs. no soakers at all. The amount of water sprayed didn't matter. When cows had soakers, body temperature was consistently lower than when they had no soakers (only shade), regardless of the amount of water used. Furthermore, both 2.6 and 9.8 gal/h/cow maintained cooling effectiveness even in hotter weather. Because these soakers differ more than 3-fold in water usage, but were equally effective for cooling, this tells us that there is an opportunity for water savings on many dairies.

We have also found that cows prefer to use soakers that spray less water. Why does it matter what the cows think? In freestalls and drylots, cows can choose when and how they use soakers. If cows avoid standing directly under the spray, then water is wasted. Currently, we are studying which soaker setups cows are most willing to use. We'll use this information to help conserve more water while maintaining cow comfort.

Detecting Pregnancy with DHI Test Day Milk Samples: Kings County Dairy Sees Value During Recent Demonstration Project

Carol Collar, UCCE Kings County and Dr. Alex Souza, UCCE Tulare & Kern Counties

Pregnancy diagnosis in dairy cattle has traditionally been accomplished by rectal palpation. This method allows large numbers of cows to be checked per hour, and also enables action immediately after the examination depending on the outcome. Drawbacks of rectal palpation are the need to lock up cows in headlocks, technician skills that can influence accuracy of the exam, time to diagnosis (usually 35 days post breeding; longer than some other pregnancy detection methods), and biosecurity issues related to palpating multiple cows with the same palpation sleeve. Available alternatives to rectal palpation for detecting pregnancy include ultrasound, blood pregnancy tests and most recently, milk pregnancy tests.

Ultrasound technology can be used to detect pregnancy starting at 28 days post breeding, a week earlier than is possible by rectal palpation. Another benefit of ultrasound is that it enables visualization of fetal heartbeats to check for calf viability. Blood tests for pregnancy diagnosis have been on the market for a few years. These tests can detect pregnancy related proteins as early as 28 to 30 days post breeding and they are reported to be as accurate as ultrasound. Last year milk based pregnancy tests became available and preliminary studies indicate that they are accurate to detect pregnancy starting 30 days post breeding. As with the blood test, the milk test measures proteins that are produced by pregnant cows. These proteins, also known as PAG (pregnancy associated glycoproteins) are not produced in open cows. The milk based method has clear advantages over other methods, because the same milk sample that is routinely collected for SCC and milk components on DHIA test day can be used. No additional handling of animals is necessary.

How accurate is the milk pregnancy test? Very accurate for confirming pregnant cows, but only moderately useful for finding open cows according to a recently published field study (LeBlanc, 2013, J. Dairy Sci. 96:2345-2348). In this study, DHIA test day milk samples from cows that were 60 or more days pregnant were used to validate the performance of the milk test under field conditions on 8 different dairies in Canada. The same day that milk samples were collected, rectal palpation was performed by a veterinarian to confirm pregnancy status. There were 661 pregnant and 22 open cows diagnosed by rectal palpation and these results were compared to the milk test results to determine sensitivity and specificity of the milk test. Sensitivity is defined as the % of pregnant cows that are correctly classified as pregnant, and specificity is the % of open cows correctly classified as open. The milk test had a very high sensitivity (99.2%), which implies that users could have high confidence that a milk test result of pregnant is accurate. The value of the test in predicting a positive outcome (pregnant) was calculated to be 99.8%. The specificity of the milk test was lower (95.5%). The negative predictive value (open) of the milk test was only 81%. About 1 in 5 milk test results of “open” was incorrect. The author of the field study concluded that cows classified as open by the milk test should NOT be injected with prostaglandin or inseminated without further confirmation of pregnancy status.

Closer to home, a collaborative field demonstration project was recently undertaken by Kings DHIA (Hanford, CA), Animal Profiling International (Portland, OR), Eden Vale Dairy (Lemoore, CA) and UC Cooperative Extension. The objective was to observe farm and DHIA laboratory experiences in implementing the milk pregnancy test (EasyPreg, API). On three consecutive DHIA test days during September through November 2013, milk samples from selected cows were shipped from Kings DHIA to API where the milk pregnancy test was performed. Cows were selected in three categories post breeding: 35-60 days (first pregnancy diagnosis), 60-95 days (confirmation of pregnancy) and 185-215 days (reconfirm pregnancy before dry off). Results of the milk test were compared to rectal palpation by the herd veterinarian within 1 to 6 days of the milk sample collection. A total of 516 milk samples were submitted for milk pregnancy testing over the three DHIA test day periods. The results of the demonstration project were similar to those reported in the Canadian study. Sensitivity was high (99.2%), and specificity was lower (87.8%). These findings indicate that the milk test is very good at finding pregnant cows, but only moderately good at finding open cows, just like in the Canadian study. Follow up evaluation of cows diagnosed “open” with the test is recommended. It is important to note that this was not a carefully controlled research study, but rather an opportunity to observe and record the experiences of one dairy producer.

Logistically, we learned a few lessons. It is important to keep breeding records in the herd data file up to date to avoid unnecessary costs associated with testing cows that have a recent breeding. About 30 samples were selected for milk pregnancy testing from cows that should not have been included for this reason. Another lesson relates to sample handling. At the DHI lab, routine samples are identified with a unique sample number that cross references to cow ID. Before sending samples to API, we learned that cow ID must be included with samples shipped, otherwise API reports results by DHI sample number which has little value for the dairy producer. To be most helpful, samples for shipment should be labeled and ordered by cow number within string. With regards to sample shipment, the first month samples were shipped overnight from Kings DHIA via the United Parcel Service (UPS) at a cost of about $1.00 per sample. The United States Postal Service priority mail was utilized for subsequent shipments at a much lower rate of $0.35 per sample. Among DHI labs, Kings DHIA has one of the fastest turn-around times for sample processing and reporting; less than 2 days. But the interval between DHIA sample collection and arrival of those milk samples at the API lab was 5 or 6 days. The milk pregnancy test is rapid and the API lab reported results for the milk tests the same day that the samples were received. Transit time and cost are clearly issues that need to be addressed. In general, the dairyman was satisfied with the performance of the milk test in finding pregnant cows. He especially liked the convenience of using DHIA milk samples for the 60-95 day pregnancy confirmation without needing to hold cows in lock-ups. A more detailed summary of the demonstration project is available from UC Cooperative Extension or Kings DHIA.

More field studies to investigate implementation strategies and farm logistics of the milk pregnancy tests as they relate to DHIA milk samples are needed. In particular, a closer look at strategies to improve turn-around time would be helpful. Further study of the potential for carryover of milk PAG in meters (cross contamination) or sampling errors in the milking parlor are also needed. Most importantly, additional research to improve the negative predictive value of the milk pregnancy test is necessary to improve the usefulness of this technology for dairy reproductive management. We look forward to leading controlled studies in collaboration with DHIA and other dairy industry stakeholders in the near future.

University *of* California
Agriculture and Natural Resources

California Dairy Newsletter

July 2014

Betsy Karle, Dairy Farm Advisor

Cooperative Extension
University of California
P. O. Box 697
Orland, CA 95963

Current Resident or: