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California Dairy Newsletter

UCCE

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Why are My Cows Down and Dying?

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

In the past few months CAHFS has seen submissions of dairy cows where the herd reports an increase in sudden death or cows that go down and die within 24 hours and are unresponsive to calcium treatment and show little or no other clinical signs. In a few herds low magnesium was diagnosed and analysis of the total mixed ration indicated that magnesium levels were generally adequate but the potassium was too high resulting in a potassium to magnesium (K:Mg) ratio of 6-10:1, while the recommended ratio is 3-4:1. These dairies have experienced 1 to 2 deaths per day with some cows found dead and others showing signs of tetany prior to death. Affected cows have reportedly been between 20 and 100 days in milk. Suspected sources of high potassium should include alfalfa hay and citrus products though other sources may also be implicated. The clinical signs of low magnesium in some cows can be confused with tetanus. Cows with low magnesium may also have low calcium and look more like a milk fever cow but fail to respond to calcium therapy.

On one dairy, analysis of serum from several cows showing knuckling in the rear legs with rapid decline and death within 24 hours revealed low potassium and phosphorus with moderately low magnesium and calcium. Low potassium is an uncommon finding and our laboratory did not learn what the source of the problem was on this dairy. Low potassium can cause profound weakness with animals unable to raise their head. Usually low potassium is associated with animals that are off feed and receiving isoflupredone acetate. The compound results in potassium loss via the kidneys and when cows are not eating they are not taking in potassium. Whenever there is an increased incidence of down cows, CAHFS strongly recommends serum samples (in red stopper tube) be collected prior to treatment and before animals are euthanized on the farm. The blood can then be submitted with the whole cow for necropsy. The serum is often the most valuable sample we receive in cases of electrolyte problems as cows do not typically have any postmortem lesions. If the serum cannot be submitted the same day of collection, the clear portion which separates from the blood clot should be removed into a separate container. The sample should never be frozen with the blood clot still in the tube.

On another dairy, a cluster of 1 to 2 week postpartum cows developed bloody diarrhea and died within 24 hours. The one cow submitted had red intestinal content and heart lesions and was diagnosed with Oleander poisoning. Oleander causes heart lesions and can be an irritant to the intestinal tract, causing intestine bleeding. The intestine lesion is not common in dairy cattle where sudden death or weakness is most often reported. The most common cause of bloody diarrhea in postpartum cows is *Salmonella* infection.

Several dairies reported cows that died suddenly or after a very short period of abdominal pain. The cows submitted had massively enlarged spleens that had ruptured and bled out into the abdomen. The spleen enlargement was from lymphocytic leukemia. Other cows died suddenly due to lymphosarcoma which had infiltrated the heart but also involved the uterus, lymph nodes and abomasum. All these cows were positive for bovine leukemia virus (BLV).

Whenever a dairy is experiencing increased death losses among the cow herd, consulting your veterinarian and submitting freshly dead or euthanized cows for necropsy may provide additional information that can prevent further losses.

Insect Pests of Animals: Searchable Pesticide Database

Dr. Alec Gerry, Veterinary Entomology Extension Specialist

The UC Riverside Veterinary Entomology Extension Laboratory has developed an on-line database of pesticides registered in the State of California for use against arthropod pests of animals. The database can be found at: http://veterinaryentomology.ucr.edu/vet_pesticides.html. Website visitors can search by animal commodity for which pest control is needed (e.g. poultry), by type of pest (e.g. poultry mite or house fly), and by application method and formulation. It is expected that animal producers and extension personnel will find this database to be much easier to navigate than the California Department of Pesticide Regulation product search website.

Animal producers may also be interested in other offerings of the ***Insect Pests of Animals*** website (http://veterinaryentomology.ucr.edu/). Visitors can find pest management information for some ectoparasite pests of poultry, cattle, and other animals. We are adding information on additional pests every few months so be sure to check back to see what has changed. We also maintain a Blog (http://veterinaryentomology.ucr.edu/blog/) that producers and extension personnel may be interested to follow. Information shared through the Blog includes recent findings related to pest management in animal facilities or of general relevance to animal producers, extension personnel, and researchers.

Finally, animal producers may be interested in taking a look at the many web links provided in our "other resources" section. In particular, there are links for producers to submit animal management questions to the national extension program through their "Ask an Expert" program. Experts from universities, extension offices, private industry, and other relevant organizations are registered with this national extension program to answer submitted questions or to provide question writers with guidance to address their questions.

If you have comments about or suggestions for our ***Insect Pests of Animals*** website, please contact me at: alec.gerry@ucr.edu or (951) 827-7054.

Salinity Management in Alfalfa Fields

Michelle Leinfelder-Miles, UCCE Delta Farm Advisor

After the driest year on record, growers may find themselves battling soil salinity. It is important to consider how dry conditions contribute to soil salinity and how it can be managed.

Salt impairment may be identified by white or black crusts on the soil surface, wet spots on the soil surface, marginal leaf burn, or the presence of salt-tolerant weeds. Salt impairs plant growth in many ways: by exerting osmotic stress that results in decreased turgor pressure in plant cells, degrading soil physical conditions that impair water penetration and the plant's ability to access water, and specific ion toxicities that vary by plant

species. Limited water supplies due to drought and deficit irrigation methods can exacerbate soil salinity, thus magnifying these stresses on plants. A brief set of definitions related to salt and salt measurements is in the note at the end of this article.

Alfalfa Site Selection

Management practices that could help to alleviate salinity effects on alfalfa include site selection, monitoring soil and water salinity, variety selection, and soil salinity management through leaching. The following table provides ideal, marginal, and undesirable site characteristics for alfalfa production.

Characteristic	Ideal	Marginal	Undesirable
Soil texture	Sandy, silt, or clay loam	Loamy sand, silty clay	Sand, clay
Soil depth (feet)	>6	3-6	<3
pH	6.3-7.5	5.8-6.3 and 7.5-8.2	<5.8 or >8.2
ECe (dS/m)	0-2	2-5	>5
ESP	<7	7-15	>15
Boron (mg/L)	0.5-2.0	2-6	>6
Water logging or high water table	Never	Only during dormant period	Sometimes during periods of active growth
Slope	Nearly level	Slightly sloping to 12% slope	>12% slope
pH of water	6.5-7.5	7.5-8.2	>8.2
ECw (dS/m)	<1.3	1.3-3.0	>3.0
SAR	<6.0	6.0-9.0	>9.0

(From Irrigated Alfalfa Management, UC ANR 3512)

A smart phone application called Soil Web can assist in identifying alfalfa sites because it provides this soil information for one's current location. Search "soil web" in your application store, or visit http://casoilresource.lawr.ucdavis.edu/drupal/node/902 for more information on smart phone and computer interfaces that provide soil information. These interfaces provide easy access to the USDA-NRCS soil surveys and were developed by members of the California Soil Resource Lab at UC Davis. While accessing soil survey information is an important first step in determining appropriate sites, periodically monitoring soil and irrigation water salinity is also important, especially since agricultural practices can change soil characteristics.

Seedling alfalfa is weak, and it is important to try to meet ideal soil conditions. Use the best quality water available on seedling alfalfa if more than one source of irrigation water is available. As the root system and crown develop, alfalfa may be able to tolerate more marginal conditions. A grower with more than one source of irrigation water could try irrigating a mature stand with a mix of good and poor quality water. Current research by Dan Putnam (forage specialist, UC Davis) and others at Fresno State is illustrating that certain alfalfa varieties may have tolerance for salty irrigation water. Tolerance appears to relate to the varieties' affinity for accumulating K^+ in the shoots rather than Na^+.

Additionally, research that I am conducting in the Delta is showing the importance of leaching even when relatively good quality water is used for irrigation. Some soils in the Delta are increasing in salinity because soil conditions and/or shallow ground water impair leaching. Understanding soil properties and the current salinity profile can help in identifying irrigation practices that could improve leaching. For example, in some fields, the soil at the top of the border check has lower salinity than that in the middle and bottom of the check. If irrigation can be modified to increase the irrigation opportunity time on the middle and bottom of the field, this may decrease salinity. This would be an appropriate strategy to try on sandy soils, but it could be risky on soils where water does not penetrate the surface well and Phytophthora infection could occur.

Another leaching strategy actually involves irrigating in the winter. In years when rainfall is sparse, irrigating before a storm will fill the soil profile and allow rain water to leach, rather than just wet the profile. Leveraging winter rainfall with irrigation could help to lower baseline soil salinity in the spring.

I recently presented information on this topic at the Alfalfa and Forage Field Day held at the Kearney Agricultural Center. That presentation is available at: http://alfalfa.ucdavis.edu/FieldDay/2014/KAC.aspx.

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Note:
Some soils are salty because parent materials weather to positively-charged cations (Ca^{2+}, Mg^{2+}, K^{+}, and Na^{+}) that join with negatively-charged anions to form soluble salts (NaCl, $CaCl_2$, $MgCl_2$, $CaSO_4$, and KCl). On croplands, salts may be carried in irrigation water to create or exacerbate salty soil conditions.

The electrical conductivity (EC), sodium adsorption ratio (SAR), and exchangeable sodium percentage (ESP) characterize the degree to which soils are affected by salt. Electrical conductivity is a measure of a solution's ability to conduct an electric current. When the solution comes from a soil saturated paste, the abbreviation used is ECe, and when the solution is water, the abbreviation is ECw. Electrical conductivity is generally expressed in units of decisiemens per meter (dS/m). The SAR describes the concentration of Na^{+} compared to the concentrations of calcium (Ca^{2+}) and magnesium (Mg^{2+}) on the soil exchange complex, and the ESP is the degree to which the soil exchange complex is saturated with sodium. Both SAR and ESP characterize the sodium status of an alkaline soil, but SAR is becoming more widely used. Note that commercial laboratory results may provide Total Dissolved Solids (TDS) instead of EC. This may be expressed as parts per million (ppm) or milligrams per liter (mg/L), which are equivalent. To convert ppm (or mg/L) to dS/m, divide by 640. To convert dS/m to ppm (or mg/L), multiply by 640.

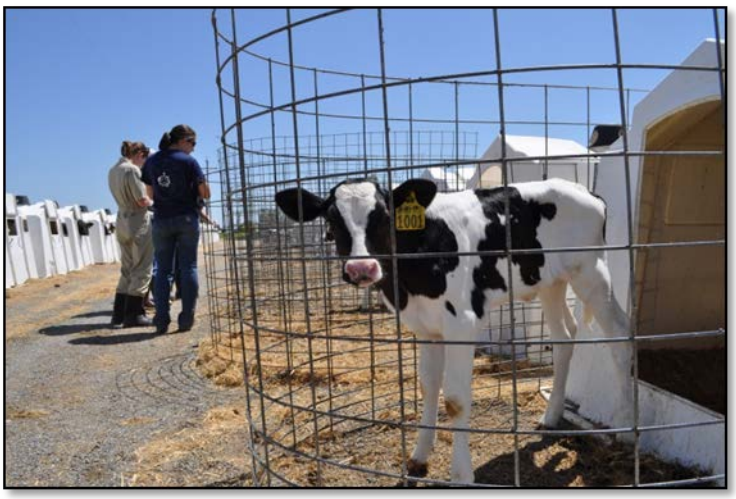
Bovine Respiratory Disease in Dairy Calves – Diagnostic Tools and Management Practices

Betsy Karle, UCCE Glenn, Tehama, Shasta, Butte, Sutter-Yuba, William Love, DVM &
Sharif Aly, BVSc, UCD Veterinary Medicine Teaching & Research Center

Pneumonia, more formally referred to as bovine respiratory disease (BRD), is the leading natural cause of death in U.S. beef and dairy cattle, causing the annual loss of more than one million animals and financial losses in excess of $700 million. Control and prevention of BRD is difficult due to the disease's multiple causes and a complex web of interacting risk factors. In addition, there is no standardized field diagnostic method that can be used for early identification of BRD cases. Typical diagnosis and treatment decisions are based on mostly subjective clinical criteria that aren't good predictors of underlying respiratory system disease. Calves with BRD will present a wide range of clinical signs ranging from severe respiratory distress to asymptomatic. The specific clinical signs presented by calves with BRD are also variable, and there are no clinical signs that *always* present in affected animals. This may lead to not detecting cases early in the course of disease, which leads to poor treatment outcomes once detected and suboptimum animal welfare and production. In contrast,

some calves may be falsely diagnosed as BRD cases leading to calves being unnecessarily treated with antibiotics which can contribute to antibiotic resistance and economic losses due to unnecessary treatment costs.

To address these issues, we assembled a team of UC Davis animal scientists and veterinarians, UC Cooperative Extension specialists and farm advisors and veterinarians from California Department of Food & Agriculture to work closely with dairy producers in a 4-year study to unravel some of the mysteries of BRD. One of the first tasks was to develop a diagnostic tool for BRD that is accurate, rapid, cheap, reliable and simple. Through a statistical analysis of a dataset of 2000 pre-weaned calves (funded originally by USDA, NIFA, BRD CAP), our team identified an on-farm scoring system comprised of 6 clinical signs (Love et al. 2014). Each clinical sign is categorized as normal or abnormal, regardless of severity (hence its simplicity). The clinical signs include nasal discharge (4 points), ocular discharge (2 points), cough (2 points), fever (2 points), breathing difficulty and rate (2 points), and ear droop or head tilt (5 points). For a calf with BRD signs, the sum of points for any of the 6 signs observed is used to determine BRD case status (Table 1). Calves are considered to have BRD if the sum of the scores is greater than or equal to 5. The scoring system correctly identified 72.2% of calves with BRD and 89.9% of healthy calves in a follow-up validation study.



Clinical Sign	Score
Spontaneous cough	2
Nasal discharge	4
Ocular discharge	2
Rectal Temp ≥ 102.5° F	2
Rapid/difficult breathing	2
Ear droop or head tilt	5

Table 1: Clinical signs and respective scores assigned by the California BRD scoring system for pre-weaned dairy calves.

To consider the scoring system in an even more simplified way, calves with any of the following are likely BRD cases:

- a head tilt or ear droop (score=5),
- nasal discharge plus one other clinical sign (score ≥ 6), or
- any 3 clinical signs (score ≥ 6).

Farm scoring sheets in English and Spanish are in final revisions and will be available soon. The next phase of our research is developing a risk assessment tool for BRD using information on housing, nutrition, and management of calves. The tool will provide valuable information for designing herd-specific BRD control and prevention programs. We are currently using the California scoring system in our on-farm research to develop this risk assessment tool. Additionally, this work complements genomics work being conducted in an associated USDA study aimed at identifying DNA-based genetic markers associated with reduced BRD incidence in cattle. For more information about this project or if you are interested in being part of the risk assessment study, email brdsurvey@vmtrc.ucdavis.edu or call Betsy Karle (530-865-1156) or your local UCCE Dairy Advisor.

Reference: Love et al. 2014. "Development of a novel clinical scoring system for on-farm diagnosis of bovine respiratory disease in pre-weaned dairy calves" https://peerj.com/articles/238/

Are You Using the Right Analytical Lab?

Dr. Deanne Meyer, UCCE Livestock Waste Management Specialist, Trish Price, UC Davis, Jennifer Heguy, UCCE Merced, Stanislaus & San Joaquin, and Dr. Dirk Holstege, UC Davis

If you're not, you may have a large headache on your hands! The Dairy General Order has specific sampling protocols as well as laboratory analytical requirements. Approved protocols are maintained at the Central Valley Regional Board's website.[1]

The Regional Board spells out the type of laboratory and the methods the laboratory should be using. Let's take a careful look at these requirements[2] so your results are acceptable to the Regional Board. Specifically, the Regional Board wants to be sure that samples arriving for analysis at a laboratory are analyzed with the correct methods and that the laboratory is enrolled in a proficiency testing program or environmental certification program appropriate for the analyses needed. **Method of analysis AND proficiency testing or certification requirements are listed.** We worked diligently to assemble the California Analytical Methods[3], a laboratory methods manual for compliance with the General Order, which is available electronically for your lab to use.

Manure analyses "shall be conducted by methods utilized by the Manure Analysis 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." Be sure the lab you use for your solid manure samples is involved in the MAP testing program. A list of participating labs is available.[4]

Liquid manure/Process wastewater "analyses shall be conducted by a laboratory 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." To see if your laboratory is accredited, go to the ELAP website[5], and click on the link for ELAP wastewater certified labs. Labs are listed by county so scroll down to your county and look for your lab. Check for "FOTs: 108" after the Expiration

[1] http://www.waterboards.ca.gov/centralvalley/water_issues/dairies/general_order_guidance/sampling_analysis/index.shtml
[2] http://www.waterboards.ca.gov/centralvalley/water_issues/dairies/general_order_guidance/sampling_analysis/sampling_and_analysis_21feb08.pdf
[3] http://anlab.ucdavis.edu/dairy-general-order-compliance-2013-nutrient-management-plan/uc_analytical_methods.pdf
[4] http://www2.mda.state.mn.us/webapp/lis/maplabs.jsp
[5] http://www.waterboards.ca.gov/drinking_water/certlic/labs/index.shtml

Date. If the laboratory is not certified in FOTs:108, and they are not participating in MAP, you should not have them run your process wastewater analysis for nutrient management purposes.

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." The list of laboratories participating in NAPT is available at the NAPT website[6]. The NAPT reference methods are from SOIL, PLANT AND WATER REFERENCE METHODS FOR THE WESTERN REGION (2003, 2nd Edition).

Irrigation water analyses "shall be conducted by a laboratory certified for such analyses by the California Department of Health Services. 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*) or other test methods approved by the Executive Officer." Refer to **Process wastewater** above.

Soil 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. This shall include analysis for nitrate-nitrogen and ammonium-nitrogen utilizing the 2 M potassium chloride extract of soil". Refer to **Plant tissue** above for information about soil analysis requirements.

Regional Water Board Electronic Submission Request

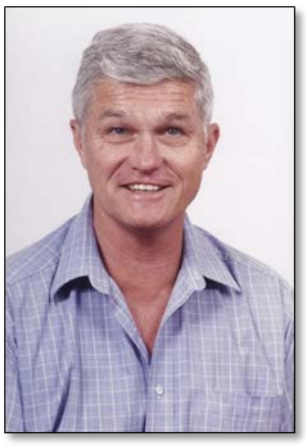
Don't Panic! If you haven't already received a letter from your Regional Water Board, you'll likely be getting one soon indicating that they have gone to electronic filing and would appreciate that you email your annual reports to them. Santa Ana dairy producers received this notice over a year ago. As of yet, annual reports have been submitted the same way as always. Dairy operators in the North Coast received a letter in summer. Their annual reports require photo documentation and those photos don't look particularly good when they're scanned in black and white. For dairy producers in the Central Valley, if you haven't received a letter requesting electronic submission, it'll be in your mailbox soon. Your reports require the base information, copies of manifests, some lab documentation, and potentially a few other forms. At this time there is no mandated requirement that reports be submitted electronically, it's just a request. It's likely that in the future, infrastructure will be put in place so that large files and multiple attachments may easily be electronically submitted to the appropriate Regional Board.

Save the Date! January 29, 2015 – UCCE California Dairy Management Series in Tulare

Don't miss this upcoming program in Tulare early next year. The topic will be cow comfort with particular focus on managing cows in the brutally hot, south San Joaquin Valley summers. Speakers will include advisors and specialists from UC Cooperative Extension and UC Davis, the National Weather Service, and dairy industry. Watch for more detail and announcements in future news releases as we get closer to 2015!

[6] http://www.naptprogram.org/about/participants/all/

Remembering Tom Shultz



Tom Shultz, UCCE advisor emeritus in Tulare County, died Aug. 22, 2014. He was 76.

Tom joined UCCE in 1979 as the dairy advisor for Tulare County, a position he held for 22 years. Tom was raised on a dairy in Corning, CA. He earned a B.S. in animal science at California State University, Chico, an M.S. in animal science at UC Davis and a doctorate at Oregon State University. He made several significant contributions to the dairy industry in his research and education career.

Tom conducted many diverse projects in collaboration with Tulare dairy producers and others to solve local problems. He was especially well known for his studies of misters during the 1980's. San Joaquin Valley summers are brutally hot. Tom quantified the increased milk production that was possible by cooling cows with water misters mounted above the stanchions where cows stand to eat. His investigations showed that cooling heat-stressed cows could increase both feed intake and cow performance. Misters were widely adopted on commercial dairies throughout the San Joaquin Valley as a result of his work. Later in his career, Tom worked with a utility company to show that oversized ceiling-mounted fans kept cows as cool as the more commonly used smaller wall-mounted fans while using less electricity.

Tom also studied agricultural by-products to determine whether materials that were previously considered waste could be nutritious cow feed. He evaluated steam processed orchard wood, tomato pomace, feather meal, kenaf paper processing residues, and other materials. This information continues to be used by dairy producers, nutritionists, and feed companies to reduce feed ration costs.

Tom also led research and education efforts addressing the environmental regulation of dairy farming, most notably land use, air and water quality. He conducted environmental stewardship short courses, monitored nutrients in dairy lagoon water for use as crop fertilizer, studied the efficiency of various manure solid separators, and monitored gaseous dairy emissions. He also played an integral part in developing the first Tulare County dairy site location and animal density guidelines to minimize environmental impacts.

Tom published 65 dairy industry articles, 17 peer-reviewed papers, and numerous scientific abstracts. Being bilingual, he published county fact sheets and videos in Spanish and English to enhance communications between dairy managers and Hispanic employees.

His colleagues – UCCE advisors and specialists who worked with Tom before his retirement in 2001, were saddened by the news of his passing. They remember him as a great friend and colleague who will be truly missed. Carol Collar, dairy advisor in neighboring Kings County remembers him as a wonderful mentor. "Tom was steadfast in scientific pursuits, with a curious mind and strong interest in finding solutions to very practical problems." But it wasn't all serious. "He could find humor in counting fly maggots, slogging around in manure, or fishing feed samples out of the rumen of a fistulated cow " she remarked. Above all, Tom was a kind and thoughtful family man. "He always remembered the names of my children, and asked about how they were doing," Collar reminisced, "even years after he retired."

Tom was a devoted husband and father. He is survived by his wife, Elena, four children: Berni, Christina, Michael and David, and five grandchildren. His greatest accomplishment in life was to create a loving and supportive family unit. Tom will be dearly missed by all. Cards of condolence may be sent to his daughter: Christina Patterson, PO Box 6, Carlsbad, CA 92018.

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