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Agriculture and Natural Resources

California Dairy Newsletter

UC CE

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In this issue…

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Milk Quality in California – Up to the EU Challenge?

Carol Collar and Noelia Silva del Rio
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What is the challenge?

Starting in 2011, the somatic cell count (SCC) in bulk tank milk (BTM) must be less than 400,000 cells/ml for milk or milk products exported to the European Union (EU). Most milk in California is marketed by cooperatives, and nearly all of them or their customers are exporting milk to the EU. This means all dairies are ultimately affected. How difficult is it to achieve SCC less than 400,000 and are we up to the challenge?

What influences BTM SCC levels?

We summarized BTM data from nearly 700 dairies during a ten-year period from 2000 to 2009. There is a seasonal pattern of SCC in California – highest in winter, lowest in spring and fall, and up slightly in mid-summer (**Figure 1**). This pattern appears to be related to weather conditions. Highest SCC in winter reflects wet conditions in corrals during the brief rainy season. In most areas there is little rain from April to October. Cows are cleaner in dry environments, keeping SCC low. So why does SCC rise in summer? Cows seek relief from intense heat in summer. They crowd under shades, creating moisture and high bacterial loads where they rest. Water from misters used for cooling may drift onto free stalls or corrals contributing to higher moisture – and higher SCC.

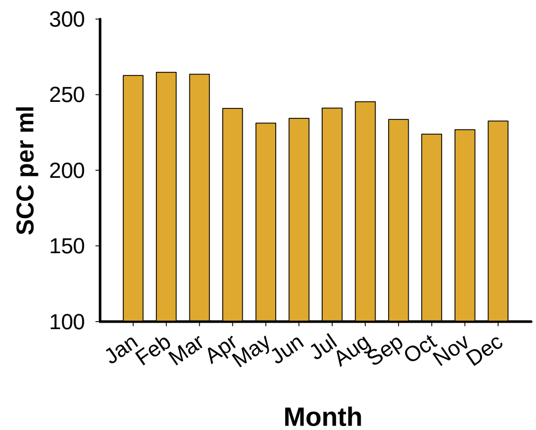

Figure 1. SCC by Month

Figure 2 shows SCC by year. There is a trend for lower SCC over the 10-year period. The year 2005 is an exception. We speculate higher SCC that year may be attributed to very high milk prices in 2004 and 2005. Dairy producers may have kept cows in the herd that should have been culled in order to ship as much milk as possible.
If we blame high milk prices for higher SCC in 2005, then how do we explain 2007, when milk prices were also high? Limits on milk production by dairy cooperatives, as well as new environmental regulations motivated dairies to cull heavily, resulting in lower SCC. Persistent constraints on expansion and economic crisis in the dairy sector have contributed to a continued trend for lower SCC, under 200,000 in 2009.

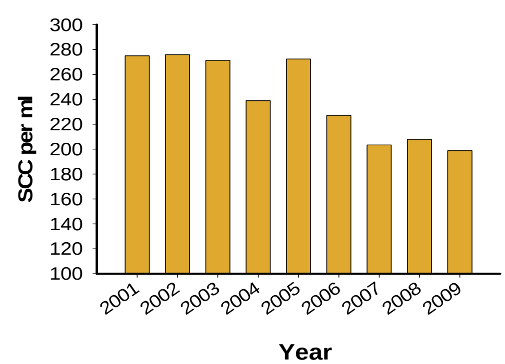

Figure 2. SCC by Year

How does SCC relate to milk yield and reproductive performance?
To evaluate the relationship of SCC with various herd management parameters, we summarized DHIA data for California herds in 2009. **Figure 3** shows milk yield per cow for herds in four SCC categories. Herds with the lowest SCC had 2357 lbs. more milk per cow than those over 250,000, and 4170 lbs. more than those over 400,000 SCC! Milk yield goes down when SCC goes up, a fact that has been known for decades. **Figure 4** shows calving interval (CI) for the same four SCC categories. Again, we see that herds with low SCC perform much better than those with higher SCC. The CI for the lowest SCC group is 1.75 months shorter than the CI for herds over 400,000 SCC. This is no surprise - research has shown mastitis reduces reproductive performance.

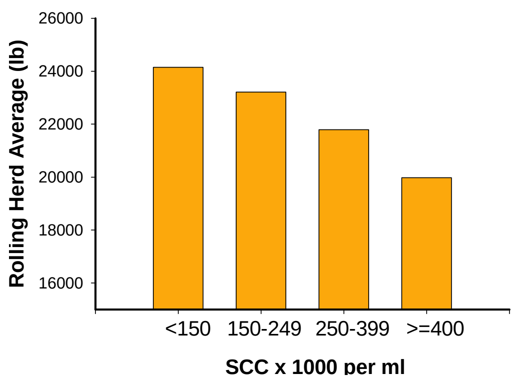

Figure 3. Rolling herd average and SCC

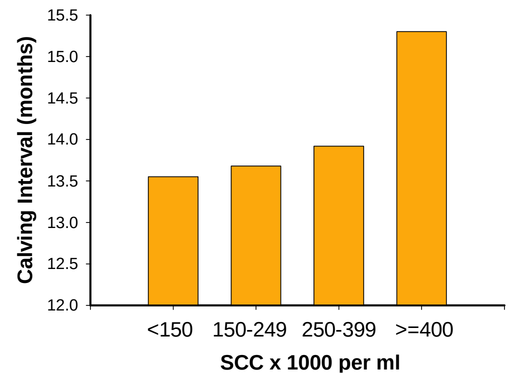

Figure 4. Calving Interval and SCC

What are the implications for high SCC herds?
Rigorous regulatory standards and quality bonuses (or penalties) have motivated most producers to keep SCC low for years. The percentage of dairies with SCC over 400,000 is only 3% when we look at 12 month averages from dairy cooperative BTM samples or the DHIA rolling herd average. A greater number will exceed this level for a day, a week, a month or longer. **Figure 5** shows the % of herds from October - 2008 to September - 2009 that exceeded 400,000 SCC in BTM on at least one occasion. In January, over 25% of herds had a high SCC tank. Clearly the rainy season is the time of highest risk.

Dairies over 400,000 SCC will face stiff penalties for poor quality, as well as higher costs for segregating and marketing their milk separately from milk that will be exported. They could even risk losing a home for their milk.

How can you keep SCC low?
Many management practices are important for maintaining a low SCC. The overwhelming evidence from California BTM data showing a connection between winter season and elevated SCC strongly suggests that housing management should be your first priority. Prepare for winter. Get bedding ready for the first big rain event. Dry lots (open corrals) are <u>not</u> dry in winter, and cows need a dry place to lie down. Wet, sloppy conditions result in filthy cows and you simply cannot wash your way out of high SCC. Elevated SCC in milk is an indication of inflammation or mastitis. Bacteria that cause these conditions thrive in crowded, dirty housing areas. Reduce the risk by careful grooming of corrals and free stalls to provide dry conditions so cows stay clean – in winter <u>and</u> summer. High quality, low SCC milk is achievable – but low moisture housing and clean cows are essential. Healthier, more productive cows and increased profits will reward you for the effort.

How does SCC in California compare to other areas of the US?
Every year the US Department of Agriculture monitors bulk tank SCC in federal milk marketing orders. California is not included in this data because it is not in a federal marketing order. We plotted our California SCC data with the USDA data from several Western States from 2001 to 2009. California's milk has been "the best in the West" for the last few years (**Figure 6**).

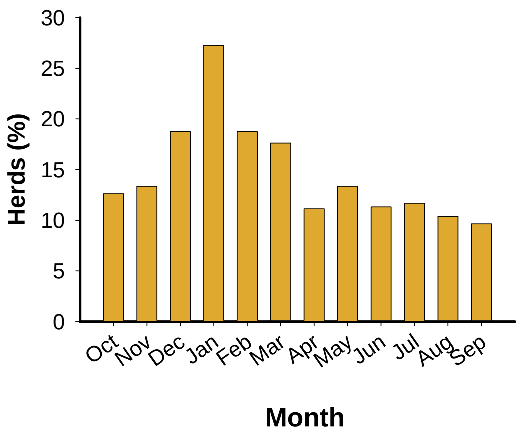

Figure 5. Herds (%) exceeding 400,000 SCC from Oct 08 to Sep-09

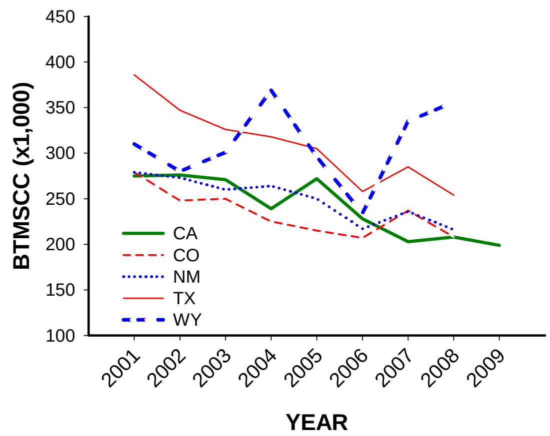

Figure 6. SCC by Year – Selected Western States

Back to Basics: Milking Procedures

Jennifer Heguy, UCCE Stanislaus & San Joaquin Counties and Ed DePeters, UC Davis

A key factor for a good milking is the hormone oxytocin. Oxytocin is responsible for milk let-down, and without oxytocin, cows will not be milked out completely or rapidly. Oxytocin is released into the blood in response to various stimuli, and causes contraction of the udder's muscle cells. Milk is available for removal from the udder because of these contractions. The process of oxytocin release can start with stimulation of the teats, specifically the teat ends, as this is where most nerve receptors are located. The sound of the vacuum pump in the parlor, or even the act of walking to the parlor, can also be stimuli for oxytocin release. Milking procedures either contribute to or depend upon this release of oxytocin.

Another important component of milking procedure basics is that it is a good practice for milkers to wear disposable gloves. Gloves are easier to sanitize than hands, helping to prevent the spread of bacteria from cow to cow as well as helping protect the milker's hands.

Step 1: Start by providing animals with a clean, low stress environment. An animal that is fearful or stressed releases adrenaline. Adrenaline inhibits oxytocin release, and reduces the action of oxytocin in the mammary gland. Cows are creatures of habit and should be brought to the parlor in the same fashion at every milking. Refrain from yelling or sudden movements, and watch for overuse of crowd gates. Dogs in the parlor or alleyways may also illicit a fear response in cows. The next few steps address preparing the udder for milking. Variations in the milking process do not matter as long as the end results are clean, dry teats and the release of oxytocin.

Step 2: Stripping teats serves as an important stimulation for oxytocin release and also allows for clinical mastitis detection. Some cows will have mastitis and never show symptoms, but abnormal milk is a sign of infection. It's important to remember that we want to strip the milk onto the floor, and never into paper towels or hands. If the milk is contaminated with bacteria, bacteria can easily spread from hands to other teats or animals.

Step 3: When applying sanitizing solution (pre-dip), the objectives are good coverage and proper contact time. Contact times vary with product, so refer to the label. Ensure the teat ends are properly sanitized.

Step 4: The final step in the preparation process is to remove the pre-dip and dry the teats. To prevent the spread of mastitis-causing bacteria from one cow to another, always use a clean towel (paper or cloth) for each animal. Milking wet, dirty teats increases the standard plate and coliform counts in milk, both of which are indications of poor milk quality and milking parlor hygiene.

Steps 5 and 6: To get the most out of milk let-down, attach milking units within 60 to 90 seconds after first stimulation for optimal oxytocin release. Remember, stimulation for milk let-down can begin when the cows enter the parlor or when the teats are stripped, so it is important to have a consistent routine. At this point, it's important to properly align the milking unit under the cow when attaching the teat cups.

Step 7: When using automatic take-off machines, ensure they are adjusted properly to remove at low milk flow. If take off is done manually, always remember to shut off the vacuum prior to removing the milking unit.

Step 8: Dip or spray every teat after milking with an effective post-dip product, ensuring total coverage of the teats. The teat ends are still open at this point, allowing easy access of bacteria into the udder. This post-application is her best defense against invading mastitis-causing bacteria. It is also advisable to have fresh feed available to cows when they return to their pen after milking. Cows should stand for 30 to 60 minutes to allow the muscles surrounding the teat opening to close the teat end. It is important that the cows return to a clean environment, for example, clean, well-bedded free stalls.

Key Points to Remember:

- Keep milking pleasant for the cows; procedures and milking equipment should allow for rapid milk out. Be sure the milking equipment is operating properly and the liners are in proper condition. Be consistent with milking procedures, as cows are creatures of habit.
- If sprinkler pens are used, the cows should be dry before entering the parlor. The goal is to always milk clean, dry cows that are properly stimulated.
- Keep a clean, low stress environment!

Look for this article in Spanish in the December 2010 edition of the California Dairy Newsletter, and please share it with your Spanish-speaking employees.

Sterile Milk Sampling

Sterile milk sampling techniques must be used when collecting milk samples for culturing for microorganisms that cause mastitis. Non-sterile collection of milk leads to errors in diagnosis of the causes of mastitis and a waste of time and money. Use the following suggested steps to avoid contaminating milk samples for culture.

EQUIPMENT NEEDED

- Sterile Sample Tubes
- Marking Pen (waterproof)
- Cotton balls or gauze pads
- 70% alcohol (isopropyl rubbing alcohol)
- Paper Towels
- Container to hold sample tubes
- Ice chest or refrigerator/freezer

1. Label sterile tube with cow identification, date, and quarter sampled.

2. Udder should be clean and dry.

3. Scrub the end of each teat with a gauze pad or cotton ball soaked in 70% alcohol. Sanitize teats farthest away first, then nearest teats.

4. Beginning with the nearest teat to be sampled, remove 1-2 streams of milk from each teat.

5. Hold the sterile sample tube and remove the cap without contaminating it.

6. Hold tube at an angle to prevent debris from entering. Do not allow the tube to touch the end of the teat. Squirt several streams of milk into the tube. Do not fill tube completely.

7. Replace the cap and place the tube in refrigeration. Freeze samples if being stored.

Repeat steps 4 through 7, one teat at a time, moving from nearest teat to farthest.

Original content by John Kirk, DVM, MPVM; UC Davis Veterinary Medicine Extension
Updated & Revised (2010) by Betsy Karle; University of California Cooperative Extension

Irrigation on Dairies: Will Shortening Your Field Save Water and Nutrients?

Larry Schwankl and Carol Frate, UCCE Irrigation Specialist and UCCE Farm Advisor

A problem facing many irrigation managers is that they would like to apply less water per irrigation but can't. There are good reasons to reduce the amount of water applied per irrigation. They include:

- Economics—becoming more efficient with irrigation water may reduce pumping costs or stretch irrigation district supplies.
- Regulations—over-irrigation may result in the leaching of nitrates. Central Valley Regional Water Control Board regulations for dairies will limit the amount of nitrogen that can be applied to 140% of the nitrogen taken off in the crop. (For example, if a crop removes 200 lbs of nitrogen, no more than 280 pounds of all forms of nitrogen should be applied). If nitrate is leached by water draining through the root zone, it is not available for the crop, and you could end up with an under-fertilized crop.

If a grower wants to adequately irrigate an entire field, the minimum amount of water that can be applied is the amount required to get water from the head to the tail of the field. This may mean that the upper end of the field receives excess water, and it may mean that on the average, the field receives more water than is required to refill the crop's root zone. The excess water often results in deep percolation (drainage) of water and possible leaching of chemicals, such as nitrate, which the water can leach as it passes through the root zone.

One of the most effective ways of reducing the amount of water applied per irrigation is to use shorter field lengths. There is a quick and easy way to determine how reducing the field length will impact the amount of irrigation water applied to a specific field. But first, a couple of important facts:

1. **Irrigation water does not "advance" down the field at a constant rate**. Those who have watched an irrigation have noticed that at first water moves quickly down the field but, later in the irrigation, water advances more slowly. Often near the end of an irrigation set, the water seems to be just slowly creeping down the field. This "slow down" occurs because as more and more of the field is covered with water, there is increasingly more water soaking into the soil (infiltrating). More infiltration means there is less water available to "push" water down the field, so the rate of advance slows. The extreme case is that if there is not enough water flowing on to the field, all the water may infiltrate in the area already wetted and then the water stops advancing and never reaches the end of the field.

2. **For most soils, the infiltration rate starts out high and then decreases the longer water is in contact with the soil.** Often, after a number of hours, the infiltration rate reaches a lower, relatively constant rate. This is actually a good thing for the efficiency of irrigation. If the infiltration rate remained constantly high (some sandy soils are like this), the portions of the field that had water sitting on them the longest could be significantly over-irrigated. A decreasing rate of infiltration mitigates this effect somewhat.

Determining the impact of reducing field length is an easy thing to do in furrow or border strip irrigated fields. All that is needed is a measuring tape, a marker, and a watch. Here is a step-by-step procedure:

Step 1: Measure the length of the field and place a marker at half the distance down the field.

Step 2: Keep track of the times: (1) when the irrigation starts, (2) when the advancing water reaches the half-way marker, and (3) when the water reaches the end of the field.

What is the impact of reducing a 1250 ft field into two 625 ft fields? We placed a marker at 625 feet down the field. The time for water to reach the 625 ft marker was 3 hrs. The time for water to reach the 1250 ft marker at the end of the field was 10.5 hrs.

If the field length was shortened to 625 ft, **two irrigation sets**, each 3 hours long, would be needed to cover what would have been the long field. The first set would irrigate the top 625 ft of the field and then the second set would irrigate the lower 625 ft. The total irrigation time for the two 625 ft fields would be 6 hrs (2 x 3 hrs).

How much water could be saved? The flow rate to the field is not even needed to determine this.

Irrigation Time	Field Length
10.5 hrs	1250 ft field
6 hrs	two 625 ft fields

Subtract the 6 hours of irrigation for the two 625 ft long fields from the 10.5 hrs of irrigation for the 1250 ft field. The water savings would be 4.5 hrs of irrigation - over a 40% savings. This would be a 40% reduction in pumping costs or a savings of 40% of district water to be used on another field, and it would likely mean that the amount of drainage water and leaching of nitrate from the root zone would be reduced.

In a field study on a 1250 ft field where flow rates were measured, 10.5 hrs of irrigation applied 12.9 in of water, while the 6 hrs (3 hrs per each of the two 625 ft fields) would have applied 7.1 in. The 12.9 in was significantly more water than the root zone could hold so drainage and possibly nitrate leaching occurred. Applying 7.1 in of water significantly reduced this.

So why doesn't everyone use short fields? Shorter fields mean more pipelines to supply those fields, a significant cost. It can also mean additional roads and additional head and tail ditches which take land out of production. It means more irrigation sets. If a tailwater return system is used, that is an added complication. Finally, shorter fields are harder to farm. Moving equipment through shorter fields is more expensive and time consuming. Some growers have reduced the cost of shortening fields by running gated pipe across the center of the field, but this has its own complications such as gated pipe cost and labor to take pipe in and out of the field.

It comes down to balancing the cost and inconvenience of farming shorter fields versus the water savings and drainage and nitrate loss reductions which shorter fields offer. From strictly a water savings standpoint, shorter fields probably are not justified unless water becomes extremely expensive or in very short supply, but when the nitrogen application limits for dairies are added in, shorter fields look better. The choice may be an under-fertilized and poorly yielding "long" field in which drainage occurred and leached the nitrate from the root zone versus adequately fertilized, higher yielding "short" fields that have significantly less drainage with less nitrate lost to leaching.

It's easy and costs nothing to determine how much water could be saved by cutting field length in half. Take the measurements and make the calculation. It's good information to have when making management decisions.

San Joaquin Air Pollution Control District has TWO Part Permitting Process

Deanne Meyer, UCCE Waste Management Specialist, UC Davis dmeyer@ucdavis.edu

By now everyone in the San Joaquin Air Pollution Control District is aware of the December 10, 2010 deadline for facilities to submit their permit application. This Air District includes eight counties (Kern, Tulare, Kings, Fresno, Madera, Merced, Stanislaus and San Joaquin). Dairies with as few as 175 cows in the San Joaquin Air Pollution Control District (District) will need to submit a permit application.

Part I. To recap, the first step in the permitting process has a deadline of December 10, 2010 for dairies not previously permitted. The District sent out meeting announcements at the end of August identifying the changes resulting in smaller farms requiring permits. The District's New Source Review Rule (Rule 2201) was changed, resulting in a significant drop to the major source threshold. Now facilities with 5 tons/yr of NOx and VOC emissions have reached the permit threshold. There are various sources of equipment that contribute towards the 5 tons/yr of emissions including: stationary and portable irrigation pump engines, emergency engines, boilers, gasoline tanks, confined animals, etc. Mobile source emissions such as tractors, harvesters, trucks, etc., are not counted towards the 5 tons/yr. For more information, see the flyer at the District website: http://www.valleyair.org/Workshops/postings/2010/09-21 10_AgWorkshops/Permitting%20Workshop%208-20-10.pdf

Part II. The second part of the permitting process will most probably have a deadline in spring. Currently, amendments to Rule 4570 are due to be voted on by the District Board on October 21, 2010. If the amendments are adopted, then a 6-month clock begins to countdown for the deliverable of the second part of the permitting process to the District. The second part will include the phase I and phase II mitigation measures to be implemented by each permitted facility. Dairies with existing permits (most likely identified mitigation measures in 2006) will need to select and submit Phase II mitigation measures within 6 months after adoption of the modifications to Rule 4570.

What happens to your paperwork? Once the district has your permit application (Dec, 2010) and your mitigation measures (spring, 2011), staff will evaluate your documents and write your actual permit. The permit will be sent to you in the mail. It will include your selected mitigation measures as well as identify record keeping and monitoring requirements.

Deliverable to Central Valley Regional Water Quality Control Board

Deanne Meyer, UCCE Waste Management Specialist, UC Davis dmeyer@ucdavis.edu

Once again, there is a December deliverable deadline to the Central Valley Regional Water Quality Control Board. This one isn't going to show up in Table 1 of your General Order unless you download it from the internet. At the April 24, 2009 Regional Water Board meeting, the Board delayed the need for producers to complete the Waste Management Plan by one year to July 2010. Table 1 of the General Order was revised to change the due date for the status report on facility retrofitting completion as proposed by the Waste Management Plan (WMP) from July 2010 to December 31, 2010. The status report shall provide the status of facility retrofitting needed to implement the WMP. There are potentially three different areas in the WMP which may require retrofitting. This status report on facility retrofitting completion is **due December 31, 2010**. Items to include in the report:

- Modifications or improvements if the existing facility's storage capacity is inadequate
- Modifications or improvements if the existing facility's flood protection does not meet the minimum requirements (protection from inundation of manured areas during flooding)
- Modifications or improvements if the existing facility's design and construction criteria of the production area are insufficient.

If no modifications are required, your report should indicate no modifications are required. Any proposed modifications or improvements must be prepared by or under the responsible charge of, and certified by, a civil engineer who is registered pursuant to California law or other person as may be permitted under the provisions of the California Business and Professions Code to assume responsible charge of such work. If modifications and improvements are being done, carefully read through the requirements in the General Order (pages B-4 through B-6).

The California Dairy Quality Assurance Program is working closely with the Regional Board to have a template available for producers to use that will meet the regulatory requirements associated with this deliverable. It is anticipated that this document will be available at http://www.cdqa.org/binder.asp , Section 6 - Document 23. For some producers, no modifications will be necessary. Yet, it is wise to submit documentation to the Regional Board indicating no modifications are needed.

VERY IMPORTANT TO DO: It is very important for producers to carefully evaluate their storage capacity calculations. Were these made with a standard 90 or 120 days of winter storage? If so, you need to ask the question—Does that agree with the information I have in my nutrient budget? If you need to store water until fields require nutrients, there is potentially a longer storage period required. Understand what you need for storage. Work with your agronomist to be sure that what was calculated in the WMP will work on the crop side as well.

Help Us with the California Dairy Survey

The University of California Dairy Advisors request your help with our California Dairy Survey. The report has been designed to take less than 10 minutes of your time, and is completely voluntary. Your individual response will remain strictly confidential and only be used in summary with similar reports from across the state. Results of this survey will help us better understand and address your needs and the needs of the California dairy industry. We thank you for your time .http://ucce.ucdavis.edu/survey/survey.cfm?surveynumber=4953

Western Dairy Management Conference Meets in Reno in 2011

Mark your calendars for the next Western Dairy Management Conference. It will be in Reno, March 9, 10, and 11, 2011. The program is filled with useful information for dairy owners, managers, and employees. A full list of topics and speakers is available at the conference website: http://www.wdmc.org.

2010 California Alfalfa & Forage Symposium – Visalia November 30 – December 2

For Registration and Full program check: http://ucanr.org/sites/Alfalfa_Forages/

Dairy producers and consultants will find highly interesting the following talks on Wednesday December 1st.

Dairy Issues and Trends

8:05 **Alfalfa Market Production and Price Trends**
***Seth Hoyt**, The Hoyt Report, Ione, CA*

8:30 **Dairy Conditions and Trends**
***Eric Erba**, California Dairies, Inc, Visalia, CA*

8:55 **Global Economic Trends: Forage, Feeds and Milk**
***Leslie (Bees) Butler**, Department of Agricultural and Resource Economics, University of California, Davis, CA*

9:20 **Impacts of Dairies and Silages on Air Quality**
***Frank Mitloehner**, Department of Animal Science, University of California, Davis, CA*

Environmental Issues and Trends

10:30 **Understanding the Biology of Silage Preservation to Maximize Quality and Protect the Environment**
***Limin Kung, Jr.**, University of Delaware, Newark, DE*

10:50 **Why We Need to Prevent Off-Site Movement of Pesticides in Alfalfa and Corn**
***Terry Prichard**, Department of Land, Air, Water Resources, University of California, Davis, CA*

11:10 **Importance of Alfalfa and Forages for Wildlife Habitat**
***Alex Hartman**, Audubon California, Sacramento, CA*

11:30 **An Environmental Balance Sheet for the Dairy-Forage System**
***Dan Putnam**, Department of Plant Sciences, University of California, Davis, CA*

Corn and Small Grain Silage and Forage Crops

1:30 **Overview of Corn and Grain Forages in US and California**
***Jennifer Heguy**, University of California Cooperative Extension, Modesto, CA*

1:50 **Anaerobic Stability of Silage**
***Limin Kung, Jr.**, University of Delaware, Neward, DE*

2:10 **Best Management Practices for Corn Silage**
***Noelia Silva-del Rio** , University of California Cooperative Extension, Tulare, CA*

2:30 **Impacts and Prevention of Mycotoxins in Silage**
***John Doerr**, Agrarian Marketing, Inc., Middlebury, IN*

3:30 **Safety of Silage Operations**
***Keith Bolsen**, Professor Emeritus, Kansas State University, Manhattan, KS*

3:50 **Tips for Growing, Harvesting, and Feeding High Quality Cereal Silage**
***Gene Aksland** , Syngenta Seeds, Visalia, CA*

4:10 **Silage Quality: How is it Defined and Measured?**
***Karl Nestor**, Senior Nutritionist, Dow Agrosciences, Wooster, OH*

4:30 **Making Silage in Custom Operations: Trials and Tribulations**
***Carol Collar**, University of California Cooperative Extension, Hanford, CA*

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Carol Collar, Farm Advisor