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Dairy Feeding Programs to Combat Heat Stress

Gerald E. Higginbotham, UCCE Fresno/Madera Counties

Now is the time to examine what changes can be made on the dairy to lessen the impacts of hot weather on dairy cows. Besides changing the cows' environment to lessen the effects of heat stress, dairy producers may also modify their feeding program in order to give their animals additional relief during hot weather. Here are some key points to consider in feeding dairy cows during heat stress:

1. Heat stress effects on feed intake

Voluntary intake of feed dry matter during hot weather has been shown to decrease to about 55% of that eaten by cows when temperatures are between 40°F to 75°F. Dry, dusty feeds are not as preferable during hot days. For this reason, wet feeds such as wet brewers or distiller grains, wet citrus pulp, corn silage, winter forage, alfalfa haylage or green chop should be utilized during hot weather.

It is important to remember that wet feeds can mold easily, therefore, a load should be consumed within 5-7 days. If one is unable to utilize wet feeds in their ration, simply adding 10-20% water to a mixed dry feed can do wonders for feed intake during hot weather. One should also clean the feed bunk area frequently in order to prevent mold buildup.

The time that you feed your cows during heat stress can also influence feed intake. In periods of hot weather it is recommended to feed 60 to 75% of the mixed ration after 6:00 p.m. The remaining 25 to 40% is to be fed before 6:00 a.m. Cows do very little eating during the day in heat stress conditions so more feed needs to be offered in the cooler hours of the day. Feed that is in the sun all day is not very palatable to the cows.

2. Possible Feed Additives

Buffers: Decreases in forage intake will lead to rations containing over 60 to 65% concentrate. This will lead to digestive upsets known as ruminal acidosis. This is due to the pH of the rumen becoming too acidic which leads to the growth of undesirable rumen bugs. Buffers are added to rations to help maintain a more desired rumen pH. Generally, symptoms such as cows off feed, low butterfat test or loose manure may indicate an acidosis problem. To help achieve optimum rumen fermentation during the summer, rumen buffers are generally recommended.

Added fat: Feeding of fats increases the energy density of the ration enabling one to decrease slightly the amount of concentrate which is fed. When feeding fat, be

careful not to feed over approximately 6-7% total fat in the ration dry matter. Higher levels can affect palatability and fiber digestion by rumen microbes. Ration adjustments should be considered when fat is added, such as to feed adequate amounts of fiber to maintain rumen digestion. In addition, higher levels of calcium (0.8 to 1.0 percent) and magnesium (.25 to .30 percent) in the total ration dry matter are recommended.

Minerals: Sodium (Na) and Potassium (K). Raising dietary Na from 0.18 to the 0.4 to 0.5% range of DM resulted in up to a 10% increase in milk yields. Research has also shown increasing K to 1.53% of dietary DM resulted in greater feed intake and higher milk yields. The increased dietary requirement of K in heat-stressed cows was attributed to greater excretion of K in sweat in hot compared to cool weather. Also, less forage is eaten in hot weather, which usually decreases K content of the ration.

Fungal Cultures: Studies in Arizona have shown reduced rectal temperatures and respiratory rates as well as increased milk yields in cows fed an *Aspergillus oryzae* extract. We examined the addition of *Aspergillus oryzae* during hot weather on a commercial dairy in Fresno County. Cows fed *Aspergillus oryzae* had lower rectal temperatures compared to controls for 9 of 12 weekly determinations. In another trial conducted under hot summer conditions in Arizona, cows fed yeast culture produced 2.0 pounds more milk per day than controls.

Summary

Milk production decreases during heat stress primarily because of reduced feed intakes. Water is the primary medium for dissipation of excess body heat and milk contains about 88% water. Cows need an abundance of clean, cool water. Remember to consider if you would drink the water from the trough that the cows are drinking from. Feeding of buffers and/or supplemental fat often allow for feeding high concentrate rations without the undesirable effects. Several by-product feeds (beet pulp, soy hulls, citrus pulp, etc.) might also aid in keeping milk fat at acceptable levels during heat stress. Milk yields were higher in heat-stressed cows when Na and K in the diet were increased. Feeding of fungal cultures (both from *Aspergillus oryzae* and *Saccharomyces cerevisiae*) modified heat stress effects while increasing milk yields and feed intakes.

Dairy Advisors' Corner

Toxic Weeds of Spring

Jennifer Heguy, UCCE Stanislaus/San Joaquin and
Mick Canevari, UCCE San Joaquin

Common groundsel (*Senecio vulgaris*) and fiddleneck (*Amsinckia intermedia*) are pyrrolizidine alkaloid (toxicant) containing plants that are commonly found in spring cut alfalfa hay and winter forages. Cooperative Extension is receiving numerous phone calls due to the increased presence of these weeds this year. Early rain allowed for November germination of groundsel and fiddleneck, and the subsequent drought conditions made the plants less susceptible to herbicide treatments. Due to the difficult economic situation, many fields were not treated. Unfortunately, these fields will go to seed thereby increasing the weed seed bank for the next several years. Both plants are especially toxic to cattle and horses, while sheep and goats are less susceptible. Toxicity results in liver damage, liver failure, and possibly, death. Delayed toxicity will occur when feeding low doses of pyrrolizidine alkaloids (PA) over an extended period of time. Ensiling PA containing plants does not decrease toxicity to a safe level for feeding. **It is not recommended to feed PA containing plant material to cattle or horses for an extended period of time.** If there are isolated areas of groundsel or fiddleneck in your fields, these areas should be harvested separately and marked accordingly. Since groundsel and fiddleneck are winter annuals, their reoccurrence in the later cuttings of alfalfa should be minimal.

Supplementing Milk with Milk Replacer Powder?

Noelia Silva-del-Río, UCCE Tulare

Feeding your calves cow's milk supplemented with milk replacer powder may have some side effects. Adding milk replacer powder to milk increases the caloric content of the final milk and makes it more concentrated (hypertonic). Changing the isotonic properties of milk from 300 milliosmol per liter (mOsm/L) to hypertonic, more than 600 mOsm/L, will increase the calves' stomach emptying rate. When this happens, less milk is digested in the stomach and more is available in the small intestine. Gut microbes such as clostridium can feed on the glucose from milk that is reaching the intestine. Clostridium growth could lead to digestive disorders and enterotoxemias. It is not recommended to feed fluids with an osmolality higher than 600 mOsm/kg unless fresh water is always available to the calves. Research data indicates that fluids with concentrations as high as 1210 mOsm/kg have been fed as a result of mixing errors, concentrating powder, electrolyte powder in milk replacer, and colostrum supplemented with mixed colostrum. **If you are implementing any of these practices, make sure that water is available at all times.** Be especially careful during hot months when calves need to drink more water. Instead of increasing the concentration of the milk/milk replacer, **consider increasing feeding volume by introducing an additional feeding or increasing the volume fed at each feeding.**

Culling Considerations

Jennifer Heguy, UCCE Stanislaus/San Joaquin Counties

With milk prices falling to non-profitable levels, cost-saving measures are imperative. When the cost to produce milk exceeds the return, one approach is to cull animals from the herd in order to decrease costs, mainly feed. Prior to sending animals to slaughter or consignment, please consider the following:

1. Do not ship downed animals. If treatment is not an option, animals should be humanely euthanized. If your dairy does not have a treatment/euthanasia plan, please speak with your veterinarian to establish protocols for downed or sick animals.
2. If there is any chance an animal will not last the duration of the trip to consignment or slaughter, do not ship the animal. Sick or weak animals would fall under this category, and should be humanely euthanized on the premises.
3. Animals that will not pass pre-slaughter inspection, such as animals with severe cases of ocular cancer (cancer of the eye), cannot enter the food supply. These animals should be humanely euthanized on the farm.
4. Very thin animals are prone to excessive carcass bruising and decreased yield. Culling animals in a timely fashion to ensure adequate body condition at the time of consignment will add value to your culled animals.
5. Ensure treatment withdrawal times have elapsed prior to shipment.

The care and well being of your animals is your responsibility. Every dairy should maintain protocols to handle downed, sick, and weak cattle. It only takes one poorly thought out incident to bring consequences on an entire industry. It is absolutely necessary to join efforts in order to maintain a positive dairy industry image. Every producer benefits from positive feedback from customers and consumers. Shipping unfit animals to slaughter is illegal and inhumane, decreasing the demand by the processing facilities and decreasing consumer appreciation for the hard work and effort you put into every gallon of milk.

Survey of Tail Docking Practices in California Dairies

Noelia Silva-del-Río, UCCE Tulare County and Pete Kistler, DVM and Betsy Karle, UCCE Glenn County

A survey of tail docking practices in California dairies was conducted in February 2009. Twelve large animal veterinarians were surveyed regarding the tail docking practices of their dairy clientele. The data set contained information from 171 dairies located in Tulare (n=91), Kings (n=15), Kern (n=4), Fresno (n=1), Butte (n=2), Glenn (n=44) and Tehama (n=14) Counties. The average herd size was 1,742 cows and ranged from 25 to 12,000 cows. Fourteen dairies currently dock tails and six dairies previously docked tails but abandoned the practice within the last year. Results from this survey are presented in **Table 1**. A total of 90.6% (n=171) of the dairies do not dock tails and 88.7% (n=294,339) of the cows are in dairy operations where tail docking is not practiced. Survey results suggest tail docking is an uncommon and diminishing practice in California.

Table 1. Current tail docking practices in California as a percentage of cows and as a percentage of herds.

	Cows		Herds	
Northern Sacramento Valley	6.8%	(n=25,737)	3.3%	(n=60)
San Joaquin Valley	11.7%	(n=268,602)	10.8%	(n=111)
Total	11.3%	(n=294,339)	9.4%	(n=171)

The authors would like to thank the participating veterinary practices for providing this valuable information.

Tail Docking Dairy Cattle

Dr. Cassandra Tucker, Assistant Professor, UC Davis

Recently, a bill has been introduced to the California State Senate that would ban tail docking of dairy cattle. If this bill passes, it would be part of a nationwide trend to set standards for how farm animals are cared for in the US.

The decision to dock tails often begins with good intentions. Farmers often see docking as a tool to improve udder health and cow cleanliness. If these benefits exist, should we stop the practice? Over the last 10 years, scientific studies have evaluated the costs and benefits of tail docking dairy cattle.

In the 2007 National Animal Health Monitoring Survey (NAHMS), cow cleanliness was scored on a subset of dairy farms included in the survey. Dr. Jason Lombard, the lead author of the NAHMS study, reported our findings at the 2008 American Dairy Science Association meeting. We found that farms that docked 50% + of their herd had more dirty cows than farms with intact tails. These results are opposite of the perceived benefits of tail docking. Instead, these results support the idea that tail docking is viewed as a management tool to improve cow cleanliness.

Direct comparisons of docked and undocked cows show that docking does not improve udder health or cow cleanliness. A local dairyman was trying to decide if he should dock or not and he approached us about conducting an experiment on his farm. He docked half the herd and then we visited regularly to measure the cleanliness of his cows and compare his mastitis records. We found no differences in either cleanliness or udder health associated with docking on his farm. Since this study, several other US researchers have looked at cleanliness, milk quality and both subclinical and clinical mastitis. Their results have agreed with our first study: no health or cleanliness benefits of tail docking.

In addition to not providing any health and cleanliness benefits, there are some disadvantages of tail docking. For example, a study from USDA found that cows with docked tails have twice as many flies on the lower half of their body compared to cows that have intact tails. Not surprisingly, the tail plays an important role in fly control for the cow.

Finally, other researchers have assessed if docking is painful for cows. Studies at University of Guelph, University of Wisconsin and USDA have evaluated the pain associated with docking with an elastrator ring or a hot iron, in both calves and cows. The results from these studies are mixed. Some find a behavioral response to the docking procedure, while others found little difference. These results indicate that the pain of docking is not severe, especially in comparison to other common procedures like dehorning.

In summary, the scientific study of tail docking has found that docked cows are not any cleaner or healthier, and have more flies on their legs and udders than undocked cows.

If you have questions about this article or tail docking research, please contact me: cbtucker@ucdavis.edu or (530) 754-5750.
The tail docking bill was passed in the time between when the article was written and the time it went to print.

Dairy Nutritionist Wins Esteemed Teaching Prize at UC Davis!

Ed DePeters, a professor in the Department of Animal Science, has received the UC Davis Prize for Undergraduate Teaching and Scholarly Achievement. DePeters teaches an undergraduate course in livestock production, and upper division courses in dairy production and animal feeds and nutrition. DePeters' research has focused on how the composition of milk, particularly the fatty-acid content, can be modified by changes in the ration, and how agricultural by-products such as almond hulls and cottonseed can be used as feedstuffs.



Congratulations Ed DePeters !

Bulk Tank Milk Quality in Tulare County

Noelia Silva-del-Rio, UCCE Tulare County

Routinely, bulk tank milk is tested to assure compliance with the national, state and local milk plants. Testing bulk tank milk helps to ensure the safety and quality of dairy products. The following tests are routinely performed in bulk tank milk:

- **Somatic Cell Count (SCC):** Measures white blood cells in milk. Indicates the prevalence of mastitis in the herd.
- **Standard Plate Count (SPC):** Measures the colony forming units (CFU) in milk after 48 hours of incubation at 90°F. Indicates the number of bacteria entering the raw milk.
- **Lab Pasteurized Count (LPC):** Measures the colony forming units in milk after being pasteurized at 143°F for 30 min. Indicates environmental bacteria resistant to high temperatures entering the milk.
- **Coliform Count (Coli):** Measures the Coliform colony forming units in milk. Indicates bacteria from manure or a contaminated environment entering the milk.

Bulk tank milk data collected from August 2007 to July 2008 by the milk inspector - HHSa Tulare County, was used to evaluate SCC, SPC, LPC and Coli (n=302 herds). The percentage of Tulare herds with all their bulk tank milk samples under the regulatory limits set by the California Department of Food and Agriculture (CDFA) was: 90.2% for SCC (<600,00 cell/mL), 71.6% for SPC (<50,000 CFU), 81.0% for LPC (<750 CFU/mL), and 52.0% for Coli (<750 CFU/mL). The SCC, SPC, LPC and Coli counts for the top 25% herds, the bottom 25% herds and the median counts are represented in **Table 1**.

The percentage of Tulare County herds in the different SCC median categories is shown in **Figure 1**. The SCC median (or middle value) for herds with less than 800 cows was 265,000 (cell/mL); between 800-1600 cows was 240,000 (cell/mL); more than 1600 cows was 235,000 (cell/mL). The SCC median from Jan-Mar was 275,000 (cell/mL), whereas from Apr-Dec was 240,000 (cell/mL).

In summary, although most of the bulk tank milk samples collected were in compliance with the CDFA regulatory limits, there is an opportunity to improve bulk tank milk quality especially regarding SCC and Coli counts.

Table 1. SCC, SPC, LPC and Coli counts for the Tulare County top 25% herds, bottom 25% herds and median counts from August 2007 to July 2008.

	SCC (cell/mL)	SPC (CFU/mL)	LPC (CFU/mL)	Coli (CFU/mL)
25% Top Herds	< 180,000	< 3,000	< 47	< 30
25% Bottom Herds	> 310,000	> 12,666	> 205	> 285
Median ¹	255,000	6,328	95	85

¹Middle value, half of the herds are above the median.

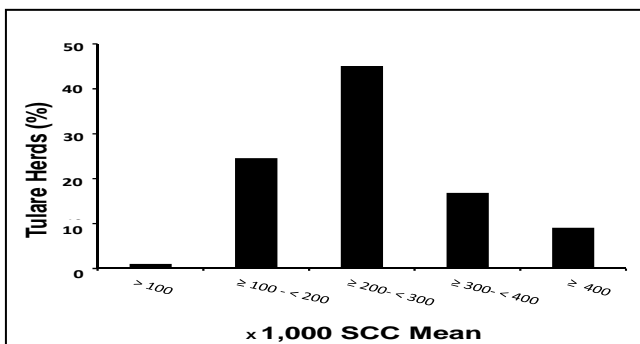


Figure 1. Percentage of Tulare County herds in different SCC median categories.

Why should I care about my bulk tank milk?

1. Your paycheck is going to reflect the results of your bulk tank milk analysis.
2. Cows with high SCC produce less milk.
3. Remember high SCC and bacterial counts are responsible for reducing shelf life, producing off-flavors and decreasing dairy product yield. The US dairy industry will be globally competitive, only if milk collected at the farm is of high quality.

How I can improve my milk quality?

1. Keep your cows in a clean & dry environment.
2. Implement good milking practices.
3. Routinely evaluate your milking equipment.
4. Clean your milking equipment using the proper detergents and the right water temperature.

Top Notch Dairy Practices

Jennifer Heguy, UCCE Stanislaus/San Joaquin Counties



Each spring, hundreds of young students take a trip to Bartelink Dairy in San Joaquin County to learn where their milk comes from. The children (and many parents) learn about everything from what cows eat to why it is important for a dairy producer to take good care of his/her animals. After a tour of the dairy, including watching animals being milked in the parlor, John serves cheese and ice cream to his eager audience. The trip concludes with a talk from the district California Milk Advisory Board Dairy Princess, and a lot of questions. Bartelink Dairy is telling the dairy industry's story, and is doing its part to educate the consumers of today and tomorrow.

Do you have an innovation, or take part in an educational activity you'd like to share with your fellow dairy producers? If yes, let your local farm advisor know and we'll try to incorporate your idea in our next issue.

Systems Management

Nyles G Peterson, UCCE San Bernardino County

When you think of your dairy, you probably think about its various parts: the milking barn, the calf nursery, and the feeding operation, to name only a few examples. If you manage your dairy by trying to maximize those individual units, do not feel alone. Since the first half of the twentieth century, America has adopted that style of management. By cutting the elephant into bite-size pieces and working to maximize those pieces, the United States has become the greatest industrial power the world has ever seen. During the last few years, a new understanding of the process of management has emerged -- systems management. At its broadest level, system thinking encompasses a large and shapeless body of methods, tools, and principles, all oriented to look at the interrelation of forces, and to see them as part of a common process.

A system is a perceived whole whose elements "hang together" because they affect each other and operate toward a common purpose. There are several major concepts in that definition. One is that the parts of a system affect each other. Another is that for a system to exist there must be a common purpose. The purpose affects the system.

What is the purpose for your dairy? Is it to produce the maximum milk possible? Is it to provide a way of life that you and your family enjoy? Is it to make as much money as possible? Management will be different depending on the purpose. If you have no well-defined purpose, there will be endless activity but no progress.

System interrelationships are often invisible – until someone points them out. If you ask yourself questions, such as, "What happens to that if I change this?" you will begin to see that every element of your dairy is part of one or more systemic structures. The dairy system is not as easily recognized as it would be in an automotive assembly line, where parts are added in sequence to make the finished product. A good systems manager is someone who can see many units operating simultaneously.

The goal of management should be to maximize the efficiency of the whole in pursuit of purpose. You cannot always maximize the whole by maximizing the individual parts. Since that point probably challenges your present paradigm, let me site an example. Let us say that an automotive engineer, working in the transmission division, discovers that by adding a certain part to the transmission, he can reduce the cost of the automobile. If the goal is to maximize the transmission division, then he will not suggest the addition of the part because it will increase the cost to his department. The part will only be added if the goal of each department is to lower the cost of the entire car.

If you have not done so already, decide on the purpose for your dairy operation, and then examine how everything contributes to that purpose. Results are only measured over time. It will take years to know if you are effectively working on purpose, but a systems approach will help you move toward that goal.

Unapproved Feeding of Cotton Plant By-Products, Including Gin Trash or Cotton Stalks

Dr. Asif Maan and Dr. Stephen Beam, CDFA

It has been brought to our attention that various cotton plant by-products such as gin trash and cotton stalks may be available as livestock feed. Article 2, Section 2678 of the California Code of Regulations details the unlawful sale or use of material containing pesticide residue. Routinely, the Feed and Livestock Drugs Inspection Program obtains samples of gin trash and cotton stalks and analyzes them for pesticide residues. With rare exception, the results indicate the products are adulterated with above tolerance residue levels of several different pesticides. If pesticide residues are detected, it is important that feed distributors and dairy producers understand that these cotton plant by-products cannot be used as livestock feed. If it is determined that any crop co-products adulterated with pesticide residues have been distributed for animal feed, the consignee and the livestock products may be held in violation of state and federal law (Title 40 Part 180 of the Code of Federal Regulations). Violations could lead to official action against the producer, with possible immediate restrictions on the sale of milk or livestock. In some cases gin trash is being used as livestock bedding. This practice may be acceptable; however, prudent judgment must be exercised to prevent livestock from inadvertently consuming gin trash that could jeopardize livestock health or the resulting food products. For additional questions you can contact Natalie Krout-Greenberg, Feed, Fertilizer, Livestock Drugs and Egg Regulatory Services Branch at 916-445-0444.

Evaluating Dairy Facility Options in the Central Valley

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Gerald Higginbotham, Betsy Karle, Noelia Silva-del-Río

Introduction

If you are considering downsizing or depopulating your dairy herd now there are at least three different options to consider for the future. Your future plans for the facility will guide your current requirements with regulatory agencies. Let's carefully review the options available and requirements of the Central Valley Regional Water Quality Control Board and the San Joaquin Valley Air Pollution Control District. You should also check with your county permitting agency to be sure you comply with local regulatory requirements.

Option 1. Sell lactating and dry animals; may or may not keep replacement heifers/calves. Plan to re-enter milking business after 12 months.

Central Valley Regional Water Quality Control Board

A dairy may temporarily reduce animal population and maintain coverage under the General Order for Existing Milk Cow Facilities as long as the operator stays current with all paperwork required under the General Order:

- completes and submits all required reports
- maintains on-farm records
- pays fees
- performs all required activities

The Regional Board expects a maintenance effort to ensure that there is no runoff from the production area and that no other prohibitions are violated. All provisions and specifications must be met. Remember the 140 day notification provision for all material changes.

San Joaquin Valley Air Pollution Control District—Producers operating with a Permit to Operate

Three activities are required in order to maintain the existing annual permit and CMP:

- the operator must inform the District of their intent, in writing;
- the annual permit or CMP fees must be kept up to date;
- the dairy must be kept in operating condition

The final requirement is site specific and may allow maintenance to equipment, turning off power, and other activities that temporarily limit the dairy's ability to operate. However, if the dairy has a permit, the owner cannot dismantle, remove, remodel, replace, etc., equipment without going through the proper permit modification processes.

Once the District is informed of the dairy producer's intent, it would take a look at the permit or CMP plan to see if there are any permit conditions that would need revision to accommodate up to a year's absence, and would work out any unusual issues with the dairy producer.

If the facility is going to be dormant for an extended period of time, it may become infeasible to maintain the conditions of the permit. Under such circumstances the operator may choose to submit an Authority to Construct (ATC) application to the Air District to designate Dormant Emission Units (DEU) as appropriate (Milk Barn; Freestall Barns and/or Corrals; Liquid Manure Management; Solid Manure Management; Feed Storage and Handling; and/or diesel engines, gasoline tanks). Once the idled emission unit is designated a DEU, mitigation measures, record keeping, monitoring and any other applicable requirements are suspended until the unit is reactivated again. The permittee is obligated to pay annual permit renewal fees. Once the permittee is ready to resume use of the emission unit, they must contact the Air District for appropriate reactivation approval. The regular filing fee (currently \$65 per emission unit) will be required for the ATC application as well as processing fees. One should allow up to 30 days for processing.

San Joaquin Valley Air Pollution Control District—for facilities NOT YET required to obtain a Permit to Operate

If an operator depopulates a dairy when the dairy is exempt from air permitting, and then repopulates an existing dairy after the permitting threshold drops (and now the exact same herd size as before triggers permits) the dairy would still be eligible to be permitted as an existing source. Implementation of BACT (Best Available Control Technology) would not be triggered by this process. Once the dairy is permitted, any changes to the dairy may require submission of an authority to construct to authorize the modifications. There will be a limited time period available for currently non-permitted facilities to seek a permit to operate (six months after the permitting threshold changes). An operator who has not yet repopulated a facility will want to apply for a permit to operate once the threshold is reduced. An operator who misses or ignores the opportunity to apply for the permit to operate when it is available will be subject to penalties. Permitting options will be determined by the District on a case by case basis.

Option 2. Sell some or all animals. Plan to lease the facility to someone else within the next 12 months.

Central Valley Regional Water Quality Control Board

It is the owner and operator of each facility who are responsible for compliance with the General Order. To maintain coverage under the General Order for the facility when the Owner of the facility opts to no longer be the operator, but instead lease the facility out--the Owner and new operator will need to complete a "Change of Owner/Operator Form" and submit to the Regional Board 60 days prior to the change (see General Order SPRR pages 4-5). The form is available at http://www.waterboards.ca.gov/centralvalley/water_issues/dairies/complying_with_general_order/dairy_forms/owner_operator_transfer.pdf.

San Joaquin Valley Air Pollution Control District—Producers operating with a Permit to Operate

All the information under Option 1 applies to dairies in Option 2. Additionally, the owner will want to transfer the permit to the lessee. This is an administrative process, requires a nominal fee for each permit unit, and can be completed within a few weeks. The paperwork must be filed prior to the lessee taking over operations.

San Joaquin Valley Air Pollution Control District—for facilities NOT YET required to obtain a Permit to Operate

Information provided in Option 1 above for facilities that are NOT YET required to obtain a Permit to Operate.

Option 3. Facility Closure: sell all animals; no future plans for the production facility to be operational as a dairy production facility.

Central Valley Regional Water Quality Control Board – RB5

Owners of dairies covered under the General Order that intend to close their facility must go through a closure process with the Regional Board (see pages 19 -20 of General Order). The Discharger must maintain coverage under the Order until all manure, process wastewater, and animal waste impacted soil, including soil within the pond(s), is disposed of or utilized in a manner which does not pose a threat to surface water or groundwater quality or create a condition of nuisance. The Discharger must submit to the Executive Officer a closure plan that ensures protection of surface water and groundwater at

least 90 days before closure. Within 30 days after completion of site closure, the Discharger shall submit a closure report which documents that all closure activities were completed as proposed and approved in the closure plan. Coverage under this Order will not be terminated until cleanup is complete.

San Joaquin Valley Air Pollution Control District—Producers operating with a Permit to Operate

Dairies with a Permit to Operate need to submit Notification to Cancel Permit. Operators will want to be very clear and specify actual permit numbers. It's important to maintain any other permits issued by the District that are part of other farming activities (i.e. gas tanks, irrigation pumps, etc.).

San Joaquin Valley Air Pollution Control District—for facilities NOT YET required to obtain a Permit to Operate

Most dairies without a permit to operate do not need to notify the District. A few dairies in this category may have CMP for the production facility. Owners at these facilities may chose to submit Notification to Cancel CMP associated with the production facility. Similar to the Notification to Cancel Permit, operators will want to be very clear and specify which CMP (at the production facility) are being cancelled. Other CMP will be maintained to minimize dust emissions as long as other agricultural operations are operational.

County Permitting Agencies

Each county is different, but some of the more common requirements might include:

- Informing the county of the vacancy
- Not starting a new business on the property (for example: switching from milking to replacement raising)
- Obtaining a Conditional Use Permit prior to re-population

The following County specific synopses are provided for reference. Producers are encouraged to contact their County with specific questions.

Kern County. Operators interested in pursuing any of the options identified above should contact Kern County Planning Department (661) 862-8615 and request to speak with Lorelei Oviatt. Options available will depend on how and if the dairy is currently permitted.

Kings County. Most zoning permits expire 6 months after a business is discontinued EXCEPT dairy and poultry zoning permits. A dairy can close down, and come back again within 2 years from the close date and continue under the old permit. If another operation begins (i.e. raising heifers commercially for someone else) during the 2 year window, then the dairy permit is relinquished. Additional operation of a dairy would require application as a new operation. It is okay to continue to raise their own replacements and keep support stock that were associated with the closed dairy operation and not relinquish the dairy permit. For additional information contact the Kings County Community Development Agency Planning Division (559) 582-3211 ex 2675.

Tulare County. The Resource Management Agency issues Special Use Permits and conducts compliance monitoring on dairies. Dairies that do not have a Special Use Permit who depopulate may repopulate to the number of animal units identified on the County's 1972 dairy list. Facilities with a Special Use Permit can be vacant for up to 2 years. An owner may rent out a facility (not exceed the number of animal units in the Special Use Permit). Notify the County if the facility is going to be rented. Notify the County if the facility is going to close. If there are any questions, producers will want to contact the County (Janie Sustaita (559) 733-6653 ex 4290) to identify site specific concerns that need to be considered.

Fresno County. Most dairies in the County exist "by-right". As such, they have not been recognized or approved through either the DRA (Director Review and Approval) or CUP (Conditional Use Permit) process (have had CEQA review). Facilities approved through a DRA or CUP process have some flexibility within a 2 year period to depopulate and repopulate the herd, maintain the existing permit as long as herd size does not exceed permit allowance. Operators interested in pursuing reducing herd size should contact the Zoning Counter (559-262-4211). Operators interested in going through a CUP process will want to work with the Zoning Department. A pre-application review will provide necessary filing materials and fee information for those pursuing a DRA or CUP application. Operations that exist "by-right" will want to contact Fresno County Department of Public Works and Planning (559) 262-4241 for further information.

Madera County. If a dairy operator sells their stock and essentially goes out of business (whether or not if they had a CUP to begin with) and wants to re-open within 6 months, there shouldn't be a problem with the County. If the operator wants to get back into business after 6 months, the operator will need to go through the Conditional Use Permit process and adhere to the Dairy Standards (with potential EIR). If the operator sells off his/her stock, and someone else comes in and wants to start up an operation (even if they will use the same operations footprint, same number of herd, etc.) they will need to go through the Conditional Use Permit process (with potential EIR) and be held to the Dairy Standards. Contact Madera County Planning Department with further questions related to dairy permitting (559) 675-7821.

Merced County. Land use permits (tied to the parcel) are issued through the Planning Department and operators must meet the environmental requirements established through Merced County Environmental Health Animal Confinement Ordinance. Various types of discretionary land use permits have been issued to dairies over the years. When the dairy permit does not identify the number of animals (cows) covered, then the information submitted in October 2005 to the Regional Water Quality Control Board serves as the permitted number of cows. Operators with a valid land use permit can de-populate and repopulate their facility. When the facility is repopulated, only the number of animals identified in the land use permit are permitted. New conditions may be added to the permit as changes occur in County, State, Federal requirements. Operators currently operating without a valid LUP have non-conforming status. A temporary reduction in herd number is permissible (as long as the time period does not exceed one year). After one year, the reduced herd size establishes the new maximum non-conforming status herd size for the facility. If an operator wishes to repopulate after 12 months with lactating cows in a facility with non-conforming status, the operator will be required to apply for a discretionary land use permit to modify facility numbers. This will require adequate review required by the California Environmental Quality Act (CEQA). Dairy operators considering modifications to animal populations are encouraged to contact Merced County Planning and Community Development Department and determine options for their specific facility related to future land use permits and environmental review procedures before leaving the facility or removing animals. The Planning Department is available at (209) 385-7654 and has recently developed a brief statement related to permitting options. Request help with dairy related questions. If there are questions related to nutrient management, contact Merced County Environmental Health Department (209) 381-1100.

Stanislaus County. All dairies have use permits which are tied to the land and never expire. New business licenses would need to be obtained. The county defers to the requirements of the Regional Water Quality Control Board. Stanislaus County Planning and Community Development: (209) 525-6330.

San Joaquin County. All dairies have use permits which are tied to the land and never expire. The permit would not change if the business changed (heifer ranch) as long as the use is not more intense. New business licenses would need to be obtained. San Joaquin County Community Development Department: (209) 468-3121.

Glenn County. Dairies may temporarily close with an "obvious intent to continue" by notifying the county in writing. Six months after closure, County Code 15.060.010d (Abandonment) applies and dairies *may* have to obtain a use permit to re-open:

15.060.010d. Abandonment. If the actual operation of a nonconforming use ceases for a continuous period of six months, the nonconforming use shall be considered abandoned unless the legal owner can establish valid proof to the contrary; then, without further action by the planning commission, the use of such land or building shall be subject to all the regulations specified by this title.

County Planner encourages clear communication with Planning Department. Dairies may enter (or re-enter) under the Dairy Element of the General Plan. Contact Glenn County Planning Dept: 530-934-6540 or 865-1204

Tehama County. No use permits issued. Dairies allowed in any Agricultural Zone. Tehama County Planning Dept: 530-527-2200.

Diagnosing Bulk Tank Milk Bacteria Counts: Know Your Enemy

Key factors influencing the level of microbiological contamination of raw milk include the health and hygiene of the cow; the environment in which the cow is housed and milked; and the procedures used in cleaning and sanitizing the milking and storage. Equally important are the temperature and length of time of storage, which allow microbial contaminants to multiply and increase in numbers.

Acquiring more information about the specific bacterial species represented in bulk tank milk can improve the power of diagnosis. In his presentation at the 2009 NMC Annual Meeting, Doug Reinemann, University of Wisconsin, summarized the sources and growth characteristics of specific bacteria types commonly found in bulk tanks (citing a review article by Murphy and Boor, 2008).

Mastitis Organisms

- Mastitis organisms that most often influence bulk milk count are *Streptococcus* spp., most notably *S. agalactiae* and *S. uberis*.
- *Staphylococcus aureus* is not a frequent contributor to total bulk tank bacteria count.
- Detecting mastitis pathogens does not necessarily indicate that they originated from cows with mastitis, as environmental mastitis pathogens may occur in milk as a result of factors other than mastitis infection.
- Correlation of somatic cell responses and bulk tank environmental mastitis organisms is poor.

Environmental Contamination

- Organisms associated with bedding materials that contaminate the surface of teats and udders include streptococci, staphylococci, spore-formers (or thermotolerant) coliform, and other Gram negative bacteria.
- Both thermotolerant (bacteria that survive pasteurization) and psychrotrophic (bacteria that grow under refrigeration) strains of bacteria are commonly found on teat surfaces. Contamination from the exterior of the udder can influence Lab Pasteurization Counts (LPC) and Preliminary Incubation Counts (PIC).
- Milking heavily soiled cows could potentially result in bulk milk bacteria counts exceeding 10,000 cfu/ml, although higher coliform (or other environmental bacteria) counts are more likely to occur due to incubation in milk handling equipment. Elevated bulk tank coliform counts can also result from coliform mastitis in the herd.

Cleaning and Sanitation

- Significant buildup of thermotolerant organisms in milk residue to a point where they influence the total bulk tank count may take several days to weeks, and are therefore an indication of a persistent cleaning failure. Old cracked rubber parts are also associated with higher levels of thermotolerant bacteria.
- Some types of cleaning failures can also select for faster growing, less resistant organisms, principally Gram-negative rods (coliforms and Pseudomonads) and lactic streptococci and can result in high PIC.
- Effective use of chlorine or iodine sanitizers has been associated with reduced levels of psychrotrophic bacteria that cause high PIC.

Refrigeration

- Elevated psychrotrophic bacteria counts are often associated with poorly cleaned refrigerated bulk tanks.
- In milk produced with low initial psychrotrophic populations, psychrotrophic bacteria can quickly become dominant after incubation at 4.4°C (40°F) resulting in high PIC.

Sources: NMC 2009 Annual Meeting Proceedings, p. 42-65 (Reinemann) and http://www.extension.org/pages/Sources_and_Causes_of_High_Bacteria_Counts_in_Raw_Milk:_An_Abbreviated_

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