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**Gratitude**



With 2020 coming to a close (thankfully!), I've been reflecting quite a bit on the past 12 months. Had I known what was in store for us last January, I don't think I would have been any better prepared for the reality of 2020. Trying to conduct research and educational programs during the midst of a pandemic has been challenging, to say the least. But as I look back on these

challenges, I want to take a few minutes to say thank you.

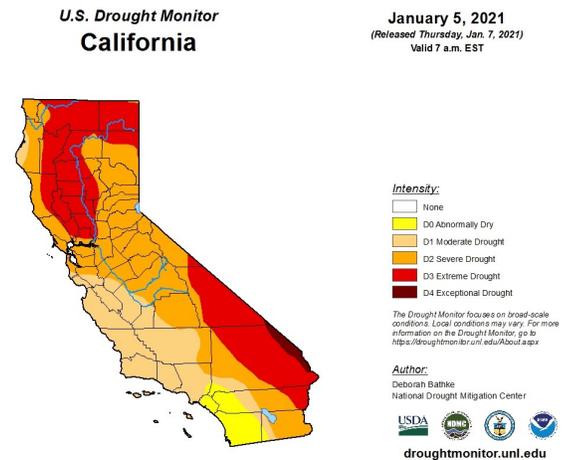
For me, one of the most rewarding aspects of working as a county-based extension advisor is the opportunity to address real-world issues that affect our communities. For the ranchers I work with in Placer, Nevada, Sutter, and Yuba Counties, this year's challenges included unpredictable precipitation and forage conditions, extreme heat, wildfires and smoke, and livestock markets disrupted by COVID-19. Throughout these trials, however, our local ranching community has pulled together - working collectively to respond to drought, fires, and down markets. I'm especially grateful to the local ranchers who have collaborated with UC Cooperative Extension to improve our understanding irrigated pasture management, livestock protection tools, and drought management strategies. Locally-led and locally engaged research is critical to the future of ranching in the Sierra foothills and Sacramento Valley - thank you for your foresight and leadership!

I'm also fortunate to work with a group of talented, thoughtful, and fun colleagues - here in the counties I serve and around the state. From campus specialists to farm advisors in other counties, I've had the opportunity to learn - and to grow personally and professionally. I'm looking forward to a time in the not-too-distant future when we can collaborate in person rather than over Zoom! And as you'll note, this newsletter features several collaborative articles!

And so while 2021 holds both uncertainty and promise, I'm looking forward to a return to hands-on, in-person extension work. I'm looking forward to addressing new needs, like improving access to targeted grazing services for communities and organizations - as well as continuing to work on ongoing issues, like protecting livestock from predators and improving on-ranch wildfire preparation. I'm looking forward to another year of living, working, and ranching in the Sierra foothills!

## Are We in for Another Drought?!

Even with the return of stormy weather before the Christmas holiday, the Sierra foothill region continues to lag behind “normal” precipitation. Based on the records I’ve kept over the last 20 years, the Auburn area has received less than half of our long-term average precipitation through December 31. Combined with a late germinating rain, the continued dry conditions, cool temperatures, and short days mean we don’t have much green forage on our annual rangelands. At least in the short term, drought seems to have returned to our part of California. The most recent Drought map confirms this: The map shows all of Placer and Nevada Counties, and the foothill portion of Yuba County, in “Severe Drought” (D2). The valley portion of Yuba County and all of Sutter County are worse off – in “Extreme Drought” (D3).



Hopefully most of us have done some drought planning – that was certainly one of the lessons I learned in 2013-2014. For our small sheep operation, our plan has started with a conservative stocking rate – we are stocked at a level that allows us to conserve some dry forage going into the fall months. We’ve also fine-tuned our supplemental feeding strategies. Now that we’ve had some moisture and germination on our annual rangelands, we’re looking ahead to mid-spring, when our forage demand will increase with the arrival of this year’s lamb crop.

### Getting the Most out of Fall Feed

In the last 5-6 years, we’ve tried a number of different protein sources. We’ve used molasses tubs from a variety of sources and with a variety of types of protein to allow our sheep to digest dry forage. We’ve used loose soy-based mixes that limit animal consumption by adding salt. And this year, we tried alfalfa hay. During late autumn and early winter, we used alfalfa again - mostly due to economic considerations.

Our experience with molasses tubs has been that some (all?) of our sheep seem addicted to the sweetness. We go through these tubs far more quickly than the label-indicated consumption rate would suggest. We’ve not found these tubs to be cost effective.

Several years ago, we switched to a loose protein supplement. These feeds use salt to limit intake; theoretically, an animal should only consume enough feed each day to get the optimal amount of protein. In our experience, the animals over-consume for several days before the salt has the desired effect – once they even out, they seem to do quite well on this protein.

But like the molasses tubs, loose protein is fairly expensive when considered from the perspective of cost per head per day. This summer, we put pencil to paper and decided to try feeding alfalfa hay. The loose protein needed to be consumed at a rate of 0.5 pounds per head per day. That meant our 84 ewes needed slightly more than one forty pound bag every day (for sake of ease, we fed just one bag per day). At \$16 per bag, the cost started adding up.

As we analyzed our alternatives, we started by considering the quantity of protein the ewes needed (rather than the percent in their diet). The bagged protein was 16% protein, which meant that the sheep were supposed to consume approximately 0.08 pounds of protein each day. Good alfalfa sheep hay is also about 16% protein. In a 110-pound bale (figuring 90% dry matter to compare it to the loose protein), we’d have just under 16 pounds of total protein. If we fed a bale to our 84 ewes every other day, they would be getting just over 0.09 pounds of protein per day on average. The bagged protein cost us \$0.19 per head per day; the alfalfa (at \$14 per bale)

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was just over \$0.08 per had per day. We fed alfalfa.

Obviously, the cost of purchasing the feed is not the only cost we need to consider. The loose protein, theoretically, can be feed in quantity, since the salt will limit intake. Hay on the other hand, has to be hand fed, which incurs a labor cost. But feeding one bale of alfalfa every other day was not a huge labor demand, considering we needed to check the sheep and feed the livestock guardian dogs every day anyway.

We also tried to objectively compare the nutritional status of the sheep prior to breeding this year (with hay) to previous years (with bagged protein). We collect body condition scores on all of the ewes before flushing (in late August). Last year, our average body condition score was 3.1 (on a scale of 1 to 5); this year, our average was just over 3.2. While I realize that two data points don't suggest

a trend (and while there are other variables to consider), I do think that our more cost effective alternative (hay) yielded acceptable results. We got the ewes through the summer months on dry feed at less than half the cost.

All of this brings me back to this fall. Even if we get rain in the next three weeks, we won't have much green grass until March at the earliest (and remember, green equals protein). Fortunately, we saved a substantial amount of last spring's forage on our winter rangeland – from a volume perspective, we have enough feed to get through the rest of the year (if not longer).

Here's a quick back-of-the envelope comparison of the cost of feeding molasses tubs versus loose protein versus alfalfa.

Source	Total Wt (Lbs)	Total Price	Total Price/Lb	DM Wt (Lbs)	% Protein	Total Protein (lbs)	Protein (lbs/day/hd - as fed)	Quantity Fed/Day (Lbs)	Ration Cost/Hd/Day	Total Cost/Day	Note(s)
Alfalfa	110	\$13	\$0.12	99	16%	15.8	0.08	55	\$0.06	\$6.50	Fed every other day
Loose Protein (soy) Option 1	40	\$16	\$0.40	40	16%	6.4	0.08	52.5	\$0.20	\$21.00	Salt limited (but fed every day)
Loose Protein (soy) Option 2	50	\$14	\$0.28	50	16%	8.0	0.09	57.75	\$0.15	\$16.17	Salt limited (but fed every day)
Tractor Supply All Stock Tub	125	\$45	\$0.36	125	16%	20.0	0.08	52.5	\$0.18	\$18.90	Observed overconsumption
Sheep Elite 18%	125	\$89	\$0.71	125	18%	22.5	0.08	46.67	\$0.32	\$33.23	Observed overconsumption

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If you'd like to look at these alternatives for your operation, check out the [Montana State University Sheep Ration Program](#). Oklahoma State University has a similar program for beef cattle, as does UC Davis.

### ***Planning Our Grazing***

Another beneficial strategy is to inventory our forage and plan our grazing strategies 2-3 months into the future. We've kept records on the forage we've harvested from our winter grazing land over the last 3-4 years. This has helped train my eye as to how much forage we have; it has also helped us predict how long our feed will last in a year like this.

If you haven't tracked this, consider starting now! While it's possible to scientifically quantify the amount of standing rangeland forage you have available, I find that our informal method works fine (and that I'm more likely to keep these informal records). We start by measuring the size of each pasture or paddock – you can do this on Google Earth or using a variety of smartphone applications. We record the day that we turn sheep into this paddock, along with the number of head, average size, and stage of production (e.g., dry ewes, mid-gestation, pairs, etc.). We can then calculate the forage harvested as the number of sheep-days per acre – that is, the number of animals times the number of grazing days, divided by the size of the paddock.

We then use this data to look ahead. If we estimate that we're harvesting 100 sheep-days per acre, we know that we'll need approximately 31 acres to graze our 100 ewes during the month of January. And since we've tracked our grazing use over several seasons, we have a fairly good idea whether this year's forage conditions are below or above "average." We can also look at the next three months. We know we'll start to grow some grass in February and March (increasing our supply); at the same time, the ewes will begin lambing (and lactating) in late February (increasing our demand). If we come up short in our estimate of forage available in the next three months, we know we'll have to make some difficult decisions – but knowledge really is power in this case.

### ***Key Dates – When Will You Need to Make a Decision***

For me, establishing a date by which we need to make a decision ***forces us to actually make the decision***. During the 2013-2014 drought, Glenn Nader (who preceded me as UCCE livestock and natural resources advisor in Sutter and Yuba Counties) said, "The only way you're gonna survive a drought is to make decisions." This advice, obviously, has stayed with me - indecision prolongs the pain (economic and otherwise) of drought.

A key date also requires us to think about a condition that must be met for a decision to be triggered. In the coming months, that condition is rainfall. If we haven't received three inches of rain by February 20 (when the ewes are due to start lambing), and if there is no rain in the 2-week forecast on that date, we'll need to make a decision.

This brings us to the last element of our drought plan - what are our options if we're still dry when lambing begins? For me, these reactive strategies are far less palatable - they cost us money (as in more expenses, less revenue, or both). Here are the options that are currently on the table:

- Purchase enough hay to get the ewes through the beginning of lambing season.
- Look for byproduct or other alternative protein and energy sources to feed the ewes.
- Sell older ewes to reduce forage demand.
- Sell replacement ewe lambs to reduce forage demand.
- Allow body condition to decline until the forage begins to grow (which may reduce lamb survival and future reproductive success).
- Find additional rangeland pasture to graze.

Over the next several weeks, we'll brainstorm additional options. We'll work through the economic ramifications of each of these options. We may choose a combination - perhaps we'd sell a few sheep and purchase hay to sustain the rest of the flock. The point here is that we've given ourselves a deadline for taking action, and we'll work through the numbers associated with each decision.

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### **If You Need Some Help...**

Drought can be a stressful time – and not just financially. I find myself checking multiple weather apps to find a favorable forecast. But having a plan helps reduce my stress level. If you'd like some help looking at your options, contact me at [dmacon@ucanr.edu](mailto:dmacon@ucanr.edu) or (530) 889-7385. Another great resource is the [UC Rangelands Drought Information Hub](#). And if you just want to commiserate with other farmers and ranchers who are coping with drought, check out the Farmer-Rancher Drought Forum on Facebook. This is a closed group that facilitates honest discussion about drought impacts and decision-making.

In the meantime, keep hoping for rain....

## **When Should Lambs be Vaccinated?**

Talk to 10 sheep producers, and you'll get at least 11 answers about when to vaccinate lambs. Some will say they should be vaccinated for clostridial diseases at birth, others say lambs need to be at least six weeks old before a vaccine will be effective. Still others will wait till weaning, while some shepherds chose not to vaccinate at all. Recent research at the U.S. Sheep Experiment Station in Dubois, ID, provides an objective answer to this question.

Newborn lambs are born without a fully developed immune system; rather, they gain passive immunity by consuming their mother's colostrum immediately after birth. Researchers at the Dubois facility compared the vaccination of pregnant ewes before lambs were born with vaccination of lambs at birth or at 28 days of age. They found that the antibodies produced by the ewes as a response to vaccination were transmitted to the lambs via colostrum, and that vaccinating lambs at birth may interfere with the ewe's antibodies the lamb acquired from the colostrum. By 28 days of age, lambs were able to produce antibodies when vaccinated.

If you're interested in this topic, stay tuned! We're working on a video on vaccination and foot health!

## **A Dry Fall and a Heavy Acorn Crop: Keep an Eye out for Acorn Toxicity**

*By Dr. Gaby Maier, UCCE Extension Specialist for Beef Cattle Herd Health and Production; Dr. Rosie Busch, UCCE Extension Specialist for Sheep and Goat Herd Health and Production; and Dan Macon, UCCE Livestock and Natural Resources Advisor (Placer-Nevada-Sutter-Yuba)*

Recent observations at the UC Sierra Foothill Research and Extension Center – and elsewhere in the Sierra Foothills and Sacramento Valley – suggests that 2020 was a bumper year for acorns! Blue oaks in particular seem to be producing an especially heavy crop. And as you may have noticed, we have not yet received a lot of rain on our oak woodlands. With many ranchers moving livestock onto annual rangelands for the winter, we should be aware of the signs of oak intoxication in livestock, especially if feed stays in short supply.

Grazing animals will consume acorns, oak leaves, and buds, especially when typical forages are in short supply. While typically a disease of cattle, oak intoxication can also affect sheep, and to a lesser degree goats and horses.

Our most common oak species in the foothills and Sacramento Valley are **live oak**, **blue oak**, **black oak**, and **valley oak**, which differ in the amount of toxins they harbor in their acorns (see images for examples). Deciduous blue oaks are distinguished by their lobular, bluish-green leaves and whitish bark. Interior live oaks are evergreen, with gray-black bark and thick, leathery leaves that may be smooth or toothed at the margin. Canyon live oaks are also evergreen and whiter bark than interior live oaks. Deciduous California black oaks are typically found higher in the foothills than blue oaks, and have large, deeply lobed leaves and gray-to-black bark. Deciduous valley oaks are typically the largest of Northern California's oaks, growing in broad, fertile lowlands. White oaks have thick bark with cube-like checks and broad leaves with three to five pairs of rounded lobes.

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The following table shows which types and parts of oaks are more worrisome than others in terms of toxicity:

**Higher in toxins**

**Lower in toxins**

**Black oaks**

**Blue oaks**



California black oak leaves

Blue oak (left) and Live oak leaf clusters

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**Green acorns**

**Ripe acorns**



**Buds, young leaves**

**mature leaves**



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How are grazing livestock affected by acorn toxicity?

The toxic compound in oak leaves and acorns are hydrolysable tannins, which causes irritation and damage throughout the digestive tract. These tannins are converted to gallic acid and phenols in the rumen, which are toxic to the kidneys. Cattle or sheep may seem dull, stop urinating or urinate more frequently, have constipation or bloody mucoid diarrhea, be unwilling to rise and have edema (fluid accumulation leading to a spongy, swollen appearance). If kidney function is impaired, livestock may not fully recover and lose condition. Young cattle and lambs are typically more affected than older animals and may not survive.

If only a small part of the diet consists of oak leaves or acorns, tannins do not cause disease but they will bind protein in the rumen decreasing available nutrition. The biggest problems arise when grazing livestock have been feed restricted and are consuming oak products “on an empty stomach”. A scenario that could result in toxicity is when feed sparsity is paired with a sudden abundance of acorns or leaves due to high winds or heavy rain knocking them to the ground where hungry livestock will consume them in large quantities. Snow storms covering up grass is another situation where livestock may seek out feed in the form of oak leaves or buds as a main source of food. However, even if forage is adequate, turning livestock into a pasture where large amounts of acorns have accumulated may tempt them to consume toxic amounts.

Goats are far more tolerant to oak toxicity for a few reasons. Tannin-binding proteins in goat saliva protect the hydrolysable tannins from being converted into gallic acid and phenols in the rumen (this is also why deer are not affected by oak toxicity). These bound proteins also stimulate the proliferation of tannin-tolerant bacteria in the rumen that produce enzymes that will metabolize unbound tannins. These processes exist in cattle and sheep, but are poorly developed. That said, the rumen microbial environment is quite dynamic and may explain why some producers witness their livestock grazing acorns without adverse effects.

### **Treatment**

A veterinarian should be consulted to determine the best treatment plan for affected cattle. Fluid therapy to restore kidney function and antibiotics to prevent secondary infections from gastrointestinal ulcers or pneumonia are the treatments of choice for cattle with oak toxicity combined with supportive care. If caught early, giving a slurry of activated charcoal via a stomach tube can help absorb some of the toxins. Make sure cattle have access to good quality hay and fresh water during recovery. Anti-inflammatories such as flunixin meglumine are **not** a good choice for this condition because they can be hard on both the digestive tract as well as the kidneys.

### **Prevention**

Prevention is critical – if your livestock are consuming a lot of acorns, or if you anticipate a big weather event leading to a sudden increase in oak products available to your cattle, you want to provide hay or other forages to dilute the effect or until grass growth is sufficient. Protein cakes, with or without polyethylene-glycol (PEG) will increase available nutrition which will encourage livestock to utilize more dry forage and PEG is a tannin-inactivating agent. Supplementing hydrated lime (calcium hydroxide) at 10% e.g. in a pelleted feed has also been recommended to prevent toxicity. If possible, fencing off oak trees is another possibility to avoid problems related to oak toxicity.

### **“Acorn” calves**

The term acorn calf is a misnomer since despite the name, the condition leading to these calves with shortened and deformed legs is not caused by the dam’s exposure to acorns. The exact cause of what is leading to these malformations is not entirely understood, but it is clear that malnutrition of the dam during mid gestation plays a role. Since drought years often coincide with an abundance of acorns, the birth of these calves was associated with the dam eating a lot of acorns during pregnancy.

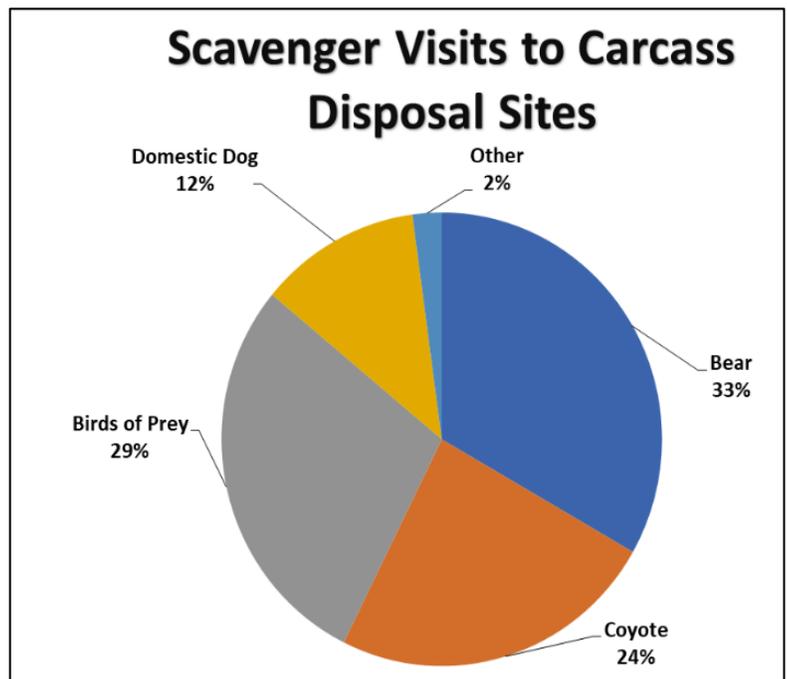
## What to do When an Animal Dies? Composting Could be the Answer

By Laura K. Snell, Livestock and Natural Resources Advisor (UCCE Modoc County) and Nicole Stevens, Lab Assistant (UCCE Siskiyou County)

When a large animal dies on your farm or ranch, what are your options for disposal? In California, there are limited legal options especially as rendering facilities have closed, regulatory burden has increased, and predators have grown in numbers. Livestock Mortality Composting could be a viable solution. Composting of mammalian tissue is legal in most states and recommended for on-farm disposal of livestock mortalities. California has allowed composting to occur on farms only during emergency situations such as high heat events, natural disasters, and disease outbreak. This research aims to make composting a legal disposal option for livestock mortalities and to provide input to streamline the regulatory agency process.

California has one of the strictest composting requirements in the country - requiring yard waste, food scraps, and more be sent to composting facilities so why are we so behind on livestock mortality composting? With livestock and dairy production contributing \$11.7 billion in 2018 (CDFA) to the state economy, change is needed to support these industries. There are currently three rendering facilities statewide located in central California between Sacramento and Fresno. In many cases these facilities are too far from livestock operations to take mortalities and the cost to transport and process carcasses is prohibitive to operations. Rendering provides a beneficial use to the carcass like composting and unlike other disposal options. Landfills can get permitted to accept livestock mortalities but there is no beneficial use to the carcass and not many landfills are properly suited.

Many livestock operations have a “bone pile” where they place livestock mortalities. This option can attract large predators such as wolves, mountain lions, bears and others making it a hazard for livestock operations with decreased predator control options. It also increases the time needed for the mortality to decompose with bones existing for years. Part of this study was to monitor predator and scavenger visits to current livestock mortality disposal sites in Modoc and Siskiyou Counties. Trail cameras have been located on current disposal sites for a little over a year. The pie chart shows the percentages of several different predator and scavenger species visits. The most common predators are bears, coyotes, and birds of prey including golden eagles, bald eagles, hawks, turkey vultures and crows. Other species include skunk, bobcat, mountain lion, and raccoon. One surprising finding during this component of the study was the frequency of domestic dogs visiting the disposal sites. Some of the dogs at the sites included livestock guard dogs while others seemed to be neighboring pets.



In 2019, a team of UCCE and CSU Chico researchers began a study looking at how livestock mortality composting would work in California. What are the current regulations preventing composting? Have studies taken place in the past? What would a composting site look like that follows current state regulations? Are all these regulations needed? All these questions led to a composting site being established at the Intermountain Research and Extension Center in Tulelake, CA. Letters and permits were submitted to agency staff from the county environmental health department, CalRecycle, CDFA, CA State Veterinarian, and the regional and state water board.

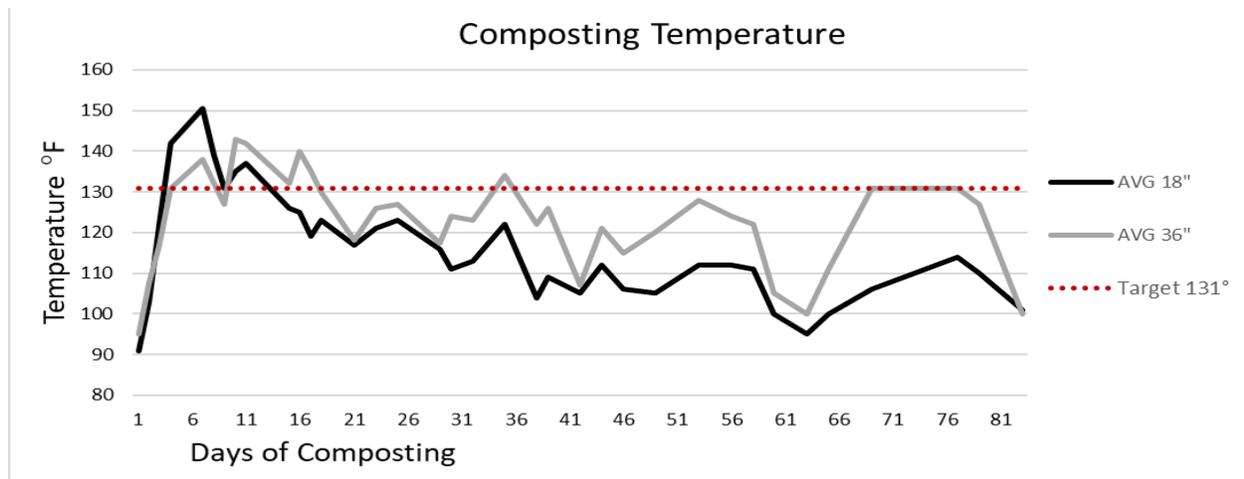
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An existing 3-sided structure with cement at the base was retrofitted to accommodate the permitting regulations for the composting pile. A metal roofed carport structure was installed within the structure as a roof, required by the regional water quality board. Base rock material was placed on the floor and a pond liner was put on top of the rock to act as an impermeable layer. Then tube sand was used to secure the pond liner and created a basin to deter any runoff from the site.

Livestock mortalities that have died only of natural causes are allowed to be composted. On August 10<sup>th</sup> we received a call that a cow was available for our project from a local producer. We were required to have a certified dead animal hauler move the animal. Once at the composting site, a layered base of fine and course wood chips and straw was laid out as an absorptive layer on top of the base rock. Materials were by-products from the Alturas Mill. The carcass was placed in the center of the structure and the carbon materials were layered on top. A sprinkler is available to add moisture as needed during the study.



Temperature readings are taken at 18 and 36 inches depth and moisture and pH are also taken. A temperature of 131 degrees Fahrenheit for 72 hours is required to kill potential pathogens in the compost pile. On day three, the pile achieved the target temperature and continued through day eight. Water is applied as needed and extra wood chips and straw are available as the pile shifts and needs extra material.

There is a good amount of research and educational material about livestock mortality composting from several university cooperative extension programs across the country. Navigating the regulatory process and coordinating with 8-10 government agencies with competing regulations makes this process currently unfeasible in California. By the end of this study, our objective will be to suggest best management practices from our research and other available science to create a streamlined approach to livestock mortality composting in California.

A big thank you to Carissa Koopman-Rivers who started this project in 2018, Dr. Kasey DeAtley at Chico State for her brilliance in study design and expertise, and the city of Alturas for carbon materials. We would also like to thank our local producer for the livestock mortality and the Intermountain Research and Extension center for their patience and monitoring help.

## New Research – Opportunities for Producer Participation!

In the first months of 2021, I will be starting several new participatory research projects – and I’ll need your help!

### *Foothill Agricultural Water Use Survey*

Working with the Nevada Irrigation District, I am developing a survey for agricultural water users in the foothills. Commercial agricultural production uses a significant amount of irrigation water in the Sierra Foothills, and water represents a significant overhead expense for most commercial producers. In most cases, this cost cannot be passed on to consumers. Crop selection criteria (high-value vs. low-value, water demand, etc.) are likely limited by soil type, climate, markets, and operator characteristics. This survey will help the agricultural community better understand how agricultural irrigation water is used, the types of crops it supports, and economic and ecological impact of irrigated agriculture within Placer and Nevada Counties. Look for this survey in late January or early February.

### *Livestock Guardian Dog Bonding Survey*

The process of bonding livestock guardian dogs with livestock is crucial to their success as adult dogs. However, little if any research-based information is available on bonding techniques. Working with UCCE Human-Wildlife Interactions Advisor Carolyn Whitesell, I have developed a producer survey designed to document the types of bonding processes used by commercial livestock producers. Our hope is that we can begin to understand the approaches that result in successful bonding – and those that do not! If you’re starting a livestock guardian dog puppy in the next year and would be willing to participate in this project, please email me at [dmacon@ucanr.edu](mailto:dmacon@ucanr.edu)!

## (Virtual) Workshops Calendar ~ Jan–Feb 2021

While the ongoing pandemic means no in-person workshops or field days for the next several months, we do have a number of virtual field days scheduled!

We’re still working out some of the details, but mark your calendars for these workshops:

<i>Date</i>	<i>Topic</i>
January 20	Protecting Livestock from Predators: Livestock Guardian Dogs and Electric Fences (with Dr. Carolyn Whitesell, UCCE Human-Wildlife Interactions Advisor) Click <a href="#">Here</a> to register. Cost is \$5/person
Late January	Tax Preparation for Farmers and Ranchers
Early February	Working with Ranchers: An Introduction for Agencies and NGO Staff
Feb 4	Cash Flow Budgeting Webinar
Late Feb / Early March	Virtual Lambing School (in partnership with the UC Hopland Research and Extension Center and Dr. Rosie Busch)
Feb 25	Responding to Grazing Lease RFPs – the basics of leasing grazing land from agencies and nonprofits

## The Sheep Stuff Ewe Should Know Podcast – Not Just For Shepherders! [Watch for Season 2](#)



Be sure to check out my weekly podcast! Sheep Stuff Ewe Should Know is available on [Spotify](#) and Apple Podcasts! Co-host Ryan Mahoney of R. Emigh Livestock and I explore a variety of livestock production and business topics – everything from genetic selection to analyzing a new business opportunity. And we have some fun along the way – interviewing legendary ranchers and comparing our favorite lamb recipes! If you have a topic idea, email me at [dmacon@ucanr.edu](mailto:dmacon@ucanr.edu)!

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Inquiries regarding the University's equal employment opportunity policies may be directed to: John I. Sims, Affirmative Action Compliance Officer and Title IX Officer, University of California, Agriculture and Natural Resources, 2801 Second Street, Davis, CA 95618, (530) 750-1397.

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