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THE ROUNDUP

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION
LIVESTOCK, RANGE, AND NATURAL RESOURCES NEWSLETTER
KERN, TULARE, AND KINGS COUNTIES



Merry Christmas and Happy New Year to all!

I hope everyone had a very enjoyable holiday season. In this newsletter you will find the regular sections of “Ask the Advisor” and the newly created “Weed Management” section. In this issue, Jim Sullins will tell us about the control of yellow starthistle. I have added a new section called “Research Update” where I will review a pertinent research article or articles in each newsletter to help keep everyone informed on some of the current scientific research, especially as it applies to issues in Kern, Tulare, and Kings Counties. For the “Research Update” section in this newsletter, I have included an article I wrote as part of my application for this position. It reviews an article published in 2003 on fecal pathogen shedding rates of cows and squirrels. I hope you find it an interesting and somewhat entertaining read, as any article on fecal matter should be. As a follow-up to the article on copper in the last newsletter, you will find an article on selenium supplementation in this newsletter. This newsletter also features a guest article from Fletch Nelson, an NRCS representative from Lancaster. As always, please feel free to contact me at: 661-868-6219 or jafinzel@ucanr.edu with questions or concerns on any topic.

Happy Trails!

Julie Finzel



LITTLE THINGS MEAN A LOT: SELENIUM DEFICIENCY IN BEEF CATTLE

Adult cattle need about 3 milligrams of selenium per day or 0.3 ppm of their diet. About 65% of beef cattle in California are selenium deficient or at risk without supplementation. Selenium deficiency is the most commonly diagnosed beef cattle health problem in California by the state diagnostic laboratory (CAHFS).

Selenium deficiency can cause a condition known as White Muscle Disease (WMD; Nutritional Myodegeneration; NMD), that affects calves from 0-4 months of age. If cattle in your herd are deficient in selenium, you might notice acute death and/or sudden lameness in calves 0-4 months of age as a result of NMD. Abortions, retained placentas and infertility in cows and bulls are a common symptom of selenium deficiency in adult animals. The abortions are due to NMD affecting unborn calves. Other symptoms include diarrhea, weight loss, decreased weight gains and ill thrift. If all of these symptoms sound strangely familiar, it's because most of them were listed in my last newsletter in an article on copper deficiency. This underscores the importance of working with your veterinarian to identify the cause of a health issue in your herd in order to implement an effective treatment plan.



The diagnosis of selenium status (deficient, normal, or excess) in cattle is straight forward and inexpensive. A blood sample from 7-10 representative cattle in a group (irrespective of number) that are not clinically sick is all that is necessary. The samples are usually analyzed within one week so there shouldn't be an extended wait time to receive a diagnosis.

There are four common methods use to supplement cattle with selenium: selenium injections, salt-mineral mixes, long-acting selenium boluses, and molasses-based supplements.

Selenium injections. This is the oldest method of treatment and selenium supplementation. There are a number of products (Mu-Se[®], Bo-Se[®], and Multi-Min[®] are the most common) and they all contain the same form of selenium (sodium selenite) at similar concentrations—5 mg/ml for Mu-Se[®] and Multi-min[®] and 1 mg/ml for Bo-Se[®]. The dose given to cattle on a per pound of body weight basis is also similar. The injections give immediate response in terms of increasing the selenium concentration in blood, however blood selenium levels return to baseline by 28 days. Therefore, injections work very rapidly, provide partial supplementation (selenium status in deficient cattle does not elevate to normal levels), and last for less than one month. They are relatively expensive if used as the sole means of supplementation.

Salt-mineral mixes. These mixes can be custom made to provide not only selenium but other minerals and vitamins to the cattle. Selenium can be added to loose salt-mineral mixes at 120 ppm and at consumption of 1 ounce of salt per head per day this will provide the necessary selenium in most cases. Most cattle eat salt on a continuous, yet irregular basis; however, consistent consumption of mineral mixes is a problem in some areas and this method may not be effective. This is the cheapest method of selenium supplementation, but it does require a certain amount of time to maintain the palatability of the mix by preventing excess moisture from getting into the mix, by preventing crusting, and keeping them clean to encourage adequate consumption. Also, selenium-containing pressed 50 pound salt blocks do not appear to be an



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ASK THE ADVISOR

What are the air pollution regulations relating to CAFOs and where are updates available?

A CAFO is a Confined Animal Feeding Operation, also abbreviated using the acronym CAF. Air pollution in the San Joaquin valley is a major concern for many people and while studies show the air quality has improved, one look at the horizon on a summer day is proof that air quality is still an issue.

The topography of the valley makes it particularly susceptible to air pollution as the surrounding mountains trap pollutants near the valley floor. The valley's hot summer temperatures promote the formation of ozone, also known as smog. Many locals may remember a time when air quality was not an issue, and the skies were clear. However, as the population of the valley increases so do the number of cars and activities that contribute to poor air quality.

The San Joaquin Valley Air Pollution Control District (Air District) covers eight counties including San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare, and Kern. According to the air district the major source of air pollution in the valley is motor vehicles, which account for more than 50% of pollutants. Many may have heard that some of the pollution found in the valley actually originates farther north in San Francisco or Sacramento and this is true. However, by the time those pollutants have reached Kern County, the majority of them have dissipated and only 7% of the air pollution can be attributed to them. In contrast, in the northern San Joaquin, 27% of air pollution can be attributed to sources outside the valley. Non-mobile farming operations, the category under which CAFs fall, account for only 7% of the air pollution in the San Joaquin Valley.

Many air pollutants can be categorized as volatile organic compounds or VOCs. Measuring VOCs from known or potential sources is a really important way of determining how much a source or sources may contribute to poor air quality. These measurements are often used when forming policy intended to improve air quality. A UC Davis researcher, Frank Mitloehner, discovered that a study conducted in 1938 was the best estimate of VOCs that originate from cattle. Technology has improved since 1938, so Mitloehner set out to obtain an updated measurement on the VOCs originating from cattle. The study from 1938 estimated VOC production from one cow at 12.8 pounds of VOCs per year, but Mitloehner's updated study showed that cows actually produce about half that amount per year, or 6.4 pounds per cow per year. From that estimate, about 40 percent, or 2.5 pounds comes from cow feces and the rest is produced in the rumen of the cow.

Along with VOCs, ozone (O₃), is one of the major pollutants that is measured and regulated. Mitloehner has also done research, with others, in the area of ozone production. He discovered that livestock feeds are the most significant source of ozone in the San Joaquin valley, estimated at about 25 tons of ozone per day. The second most significant source is estimated to be light duty vehicles at about 14.3 tons of ozone per day. The majority of the ozone attributed to animal feed forms and is released from corn silage.

The air district is responsible for developing plans and implementing control measures designed to improve air quality so that it meets state and federal standards. Their website can be found at: <http://www.valleyair.org/Home.htm>. A complete listing of regulations that pertain to CAFs can be found under Regulation IV, Rule 4570 at: http://www.valleyair.org/rules/currnrules/R4570_1010.pdf. Recent updates to rules and regulations can be found at: http://www.valleyair.org/rules/rules_recently_adopted.htm.

What is Teff grass and where can I find Teff grass hay?

This question came in over the phone and sent me on what felt like a wild goose chase, but it turned out to be a very interesting and ultimately successful wild goose chase. Teff

ASK THE ADVISOR, CONT...

grass (*Eragrostis tef*) is a warm season annual grass that originated in Africa where it is grown as a grain. It was introduced to the US as an alternative source of flour for individuals affected by Celiac's Disease (gluten intolerance).

Recently, teff has been gaining popularity as a feed source for livestock. Because it was developed as a grain, available varieties would mature early and subsequently weren't suitable for haying. Through careful selection, researchers created varieties that mature later and produce high quality forage. One of the main advantages to teff is its high yield combined with its high forage quality. Teff grass can be fed as hay or turned into silage.

Teff hay is popular among horse owners because the nutritional content is similar to Timothy. Crude protein in teff hay is 9-14% and crude protein in timothy hay is 8-14%. Total digestible nutrients or TDN in teff hay is 55-64, while TDN in timothy hay is 57-65.

Because teff is a warm season grass it is very susceptible to frost, in fact, it is not recommended that teff be planted until all risk of frost has passed and the soil temperature is at least 65° F. Also, to ensure a successful planting, a very firm seed bed is required and the seeds should not be placed deeper than ¼" into the soil. Due the small size of the seed produced by teff, growers usually prefer to use coated seed when planting. Teff is considered a low input crop, as very few disease and pest problems have been observed since its introduction to the US.

After making a few calls I was able to find out that the variety most often planted here in the valley is Tiffany Teff. While teff may be a more affordable alternative in some areas, there is a high demand for teff hay here in the valley and most cuttings are sold before they've even been baled. This drives the price of teff hay up to about the same price as alfalfa. If anyone would like more information on teff hay or where to find it, please feel free to contact me at: 661-868-6219 or at: jafinzel@ucanr.edu.



WHAT CAN NRCS DO FOR YOU?

courtesy of Fletch Nelson, NRCS Rangeland Management Specialist, Lancaster, CA

In the last issue of "The Roundup," Julie explained the differences between UC Cooperative Extension and the Natural Resources Conservation Service (NRCS). Her summary of NRCS's role in agriculture was spot-on. NRCS was originally created as the Soil Conservation Service in 1935, in response to the Dust Bowl. Our mission is "Helping People Help the Land," and to that end, we offer solutions for resource problems on farms and ranches, and cost-share programs to help fund conservation projects.

My job as a rangeland specialist is to help livestock producers develop conservation plans for their operations. A conservation plan identifies resource issues you may want to address – such as gully erosion, wildfire hazard, inadequate stockwater, or weeds – and then designs solutions for those problems. Common conservation projects on grazing land include stockwater developments, cross-fencing and riparian fencing, grazing system planning, gully repair, and weed control. Once you have your conservation plan in hand, NRCS has a number of cost-share programs available through the Farm Bill to help fund the work. If you have questions about resource concerns on your operation, or about our cost-share programs, please call me at (661)945-2604 ext. 111. My local service area is limited to east Kern County, with the line running about north-south from Kernville to Keene, but if you happen to be in a different area, call anyhow, and I can refer you to your local NRCS field office. More information on NRCS in California is available at <http://www.ca.nrcs.usda.gov/>.



PELLETS, PIES, AND PLACEMENT: A LOOK INTO THE WORLD OF *CRYPTOSPORIDIUM PARVUM*

Cryptosporidium parvum (*C.parvum*) is a protozoan life form that causes cryptosporidiosis in many mammalian species, including humans and cattle, is considered highly infectious, and is zoonotic, meaning it can be transferred from animals to people and vice versa. Symptoms appear as severe intestinal distress, generally consisting of 2- 4 days of watery diarrhea. *C. parvum* is spread through the ingestion of oocytes excreted in fecal matter. In humans, it has been found that as few as 30 oocytes caused infection in 20% of those studied. Humans and animals shed *C. parvum* in their fecal matter. Animal carrier species can be wild or domestic and include cattle, llamas, alpacas, sheep, deer, horses, pigs, and ground squirrels. *C. parvum* often infects humans via water and there is no chemical method of killing the organism in drinking water. *C. parvum* has been found in 65-97% of surface water tested in the U.S. *C. parvum* is self-limiting in healthy individuals, but can severely affect individuals with compromised immune systems. As such, its presence in drinking water is a major health concern and cattle are often considered a leading cause of contamination.

E.R. Atwill and other researchers at UC Davis published a study in 2003 that investigated the rate at which cattle shed *C. parvum* oocytes. They used an ultra-sensitive test that was able to detect the oocytes at much lower levels than what had been utilized in previous studies. They found that one cow sheds, on average, 4,208 oocytes of *C. parvum* per day. Previous estimates had been as high as 170,000 oocytes per



cow per day. The newly calculated shedding rate of 4,208 oocytes was substantially lower than the average daily shedding rate of 113,000 oocytes produced by one California Ground Squirrel in one day. Atwill and others also showed that there was no significant difference between pre- and post-parturition shedding rates. This study was conducted using three herds of beef cattle grazing oak and annual grassland savannahs. The UC Davis researchers noted that genotypes of *C. parvum* vary geographically and also that shedding rates vary between beef and dairy cattle. An infected dairy calf has been shown to shed up to 100 times more oocytes per day than a mature beef cow. Environmental loading rates are expected to rise as the concentration of cattle per acre increases, for example in feedlots and on dairies.

Atwill and colleagues have successfully proven that considering cattle to be the leading source of *C. parvum* oocytes in surface water does not hold up when dealing with beef cattle grazing rangelands. The number of oocytes deposited by ground squirrels alone far outnumbers those deposited by beef cattle and that does not take into account oocytes deposited by other animals, wild or domestic. Therefore, according to this study, adult beef cattle grazing on annual grassland oak savannahs in California cannot be considered the leading source of *C. parvum* oocytes in the environment and in surrounding surface water.

SELENIUM DEFICIENCY, CONT...

effective way to supplement cattle. The trace minerals, including selenium, appear to leach out of the blocks once they get wet (rain, dew, saliva) and are not available to the cattle.

Selenium boluses. These are devices that reside in the rumen of cattle and meter out an appropriate amount of selenium over time for the animal. They are usually pill-shaped and must be given orally, which can be a limiting factor for some operations. Currently, there is only one of these products available for use in cattle (*Se 365* sold to ranchers in California by the California Cattlemen's Association—Full Disclosure: this product is manufactured by Cathy Maas who also holds the patent for this device). This bolus provides supplemental selenium for one year and has been used effectively in California for over a decade. Challenges with this method include the administration and the fact that cattle can spit the boluses out in the corral after they are given and rarely tell you they did that.

Molasses-based supplements. This is an excellent method for adding selenium to the diets of cattle. They are very palatable, come in a number of formats (blocks, tubs, lick tanks), and supply energy, protein, and any number of minerals and vitamins that can be added. They are relatively expensive and usually not fed on a year round basis as their primary nutrients—protein and energy—are not needed on a year round basis. There is no standard amount of selenium that is added to these supplements (or to the salt-mineral mixes discussed above) so you have to specify or carefully check the ingredient list and label for the amount of selenium in the product. This is a situation where good advice from a professional is worth the money.

There are other methods promoted from time to time such as cafeteria-style free choice feeders—these and other unproven methods should be avoided at all costs. Rely on your veterinarian or nutritionist for sound advice on an ongoing basis for these very important, “small” decisions.

Too much of anything can have negative consequences and selenium supplementation is no different. Too much selenium in the diet can cause the hooves to fall off and the hair (particularly tail hair and hair on the top of the neck and shoulders) to fall off. This is usually due to toxic plants in the high desert regions that accumulate selenium. However, occasionally very high levels of selenium can be found in deep wells. Also, mistakes in supplements have been made from time to time.

Special thanks to Dr. John Maas with the UC Davis School of Veterinary Medicine for his contribution to this newsletter by providing the article above.



A seed head from a mature Yellow Starthistle plant.



WEED MANAGEMENT: YELLOW STARHISTLE

Background

Few noxious weeds have had a greater impact on our California rangelands than Yellow starthistle (YST). Yellow starthistle (YST), a native to Eurasia, was introduced to California around 1850, probably via South America. It is now common in open areas, on roadsides, rangelands, wildlands, hay fields, pastures, and waste areas. Recent reports indicate that Yellow starthistle infests between 10 and 15 million acres in California. Yellow starthistle is known to be toxic to horses and other equines when at least 600 pounds is consumed over 30 to 45 days. It causes a disease known as chewing disease that is irreversible and ultimately fatal.

It is a gray-green to blue-green plant with a deep, vigorous taproot. It produces bright, thistle like yellow flowers with sharp spines surrounding the base. Yellow starthistle grows to heights varying from 6 inches to 5 feet. It often forms dense infestations and rapidly depletes soil moisture, thus preventing the establishment of other plants. Infestations may be so dense that the land is lost to grazing, habitat for wildlife, and recreation. Many small acreage land owners are unable to control yellow starthistle due to a lack of knowledge on noxious weed control, cost of adequate spray equipment and lack of training. See <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7402.html> for more general information.

In many instances, YST will take over large areas, reducing valuable forage to almost nothing. When mature, YST often makes it very difficult for livestock to travel through, let alone graze. In 1995 it was estimated that California had 12 million infested acres and in Tulare County it was estimated we had 20,000 acres, therefore developing control strategies for YST became a priority. In 1997 Development and testing of new chemical controls, resulted in a selective and effective tool, Transline® with the active ingredient of **clopyralid**. In 2006, Milestone® with the active ingredient of **aminopyralid** was approved for use in California, and soon became the primary chemical control choice for YST control in rangelands due to its combined pre- and post-emergent activity and improved selectivity.

The Tulare County Weed Management Area (TCWMA) was formed in 1999, and began a land-owner cost share YST control program in 2002. From 2002 to 2012, ten out of eleven years the Tulare County Weed Management Area has been able to offer a cost share YST control program. During that time the TCWMA has successfully treated 385 properties for a total of 2,600 acres. At the same time many ranchers have implemented their own successful ground and aerial control programs, greatly reducing the number of infested acres and the spread of YST. Due to funding limitations, Kern and Kings Counties do not have weed management programs comparable to Tulare County.

Your Bottom Line

As a rancher, what is it worth to you, to control a noxious weed such as Yellow starthistle? What is an acre of feed worth? There are a couple of ways to put a pencil to this. Let's look at a couple scenarios with infestations so heavy the land cannot be grazed:

1) With a typical carrying capacity of 12 acres per cow, that means you are harvesting about 12,000 lbs of forage per cow at 1000 lbs per acre (an average cow-calf unit needs about 1000 lbs of air dry forage per month). If you had to replace that forage with Oat hay at a price of \$150 per ton, that acre of forage was worth \$75. So if you can bring that infested acre back into grass production for less than \$75 acre you break even, and that does not even consider the following years benefit (note you will probably have to treat multiple years on heavily infested fields). What if that was really good ground, with a



YELLOW STARHISTLE CONTROL, CONT...

carrying capacity of 6 acres per cow? That means each acre could produce an average of 2000 lbs forage, and would take \$150 of Oat hay to replace it. You could spend \$150 per acre and breakeven, the next year in replaced forage.

2) If you were leasing your ground, what is it worth? Using the same carrying capacity of 12 acres per cow, with the acre of ground providing 1000 lbs of forage and you are paying \$15 per acre rent. You may replace the forage with Oat hay at \$75 and with the rent of \$15 that acre has a cost of \$90 with no return, so bringing it back into production has a breakeven of \$90 per acre.

Perhaps none of these scenarios apply to you, in that case, you will need to do your own math to determine what your breakeven cost is to treat your noxious weeds. The take home point is that the lost forage has a value and the value of the lost forage can help offset the cost of control. Whatever your individual circumstances may be, it is important to remember that weeds do not sit still. An infestation can double in one year under the right circumstances.

Conclusion

From 1998 to 2008 UCCE conducted several trials on noxious weed control, determining the efficacy of products on our most common and most noxious weeds, including Yellow starthistle, Milk Thistle, Italian Thistle, Tarweed, Fiddleneck, and others. Several products provide some control, however the two most effective have been Transline® and Milestone® based on their efficacy, post and pre-emergent activity, and ease with which they may be used with grazing livestock under range conditions. Transline® and Milestone® selectively control the targeted noxious weeds with little or no damage to annual or perennial grasses.

Transline® provides excellent control of YST with a very high level of selectivity. This means if you have a heavy YST infestation that you want to control and yet minimize the effect you may have on other preferred broadleaf such as Filaree, medics, or sub-clovers (which are valued components of our annual range), then Transline may be your product of choice.

However, we have found that Milestone® has advantages over Transline® that should be considered. It has a broader spectrum of control, so if there are other noxious weeds besides YST, Milestone will give better control. An example is the pre-emergent control of Fiddleneck, whereas with other products Fiddleneck often comes in to replace the YST. Milestone® can be used much earlier in the year, providing an opportunity for an early release of grass species, thereby increasing the grass competition with other less valued broadleaf. Demonstration trials have shown that chemical control combined with moderate late season grazing provided the most effective response and conversion to preferred grass species. The recommendations above can be applied to most annual thistles found in California.

The control of invasive noxious weeds should be a part of your management goals. It should be planned in advance and incorporated into your operating budget and grazing plans. The best window to treat YST and other noxious weeds on an average year is from mid-February to mid-April. Effective control is more likely and the opportunity for your forage to be competitive with the noxious weeds is optimal. Milestone® and Transline® are not restricted products, however, the individual spraying the herbicide will need to obtain at least the Private Applicator Certificate from their local Ag Commissioner to be qualified to purchase Transline® or Milestone®, and a use report is required.





INTERNET RESOURCES AVAILABLE THROUGH UCCE

One of the resources I have been working to make available is my website, which can be found at: <http://cekern.ucanr.edu/Livestock/>. It can also be accessed through any of the three UC Cooperative Extension websites for Kern, Tulare, and Kings Counties. Clicking on the “Livestock and Natural Resources” button on any of those three webpages will direct you to my main page. Once you’re there, you will find two tabs on the left hand-side under the “Livestock and Natural Resources” button. One says “Links” and the other says “Newsletters”. Archives of *The Roundup* will be available for up to two years after printing at the “Newsletters” link. You will also find any news releases I have sent out electronically there. For example the two recent emails I sent before this newsletter were information handouts from the Vet Med Teaching Center in Tulare. One was on copper and selenium supplementation and the other was on neonatal death in calves whose dams were grazing on moldy vetch.

Under the “Links” tab I have included links to many websites where information can be accessed. I have a link to the Cow-Calf Management Guide, otherwise known as the yellow book. I have provided a link to two websites where information can be accessed on plant species, the Jepson manual website and the USDA PLANTS website. There is a link to the UC Weed Resources and Information Center (UC WeedRIC) which has information on how to control common weeds found in California in addition to much more. I have links to multiple resources for toxic plants, some of which can also be accessed through the UC WeedRIC site. On my main page you will find a blog where I post information on topics relevant to livestock production and range management today, especially current events. I update the blog periodically, based on current events and information I receive. If you haven’t had a chance to visit my webpage yet, I would encourage everyone who has internet access to take a few minutes and go to: <http://cekern.ucanr.edu/Livestock/>.



TULARE COUNTY WEED MANAGEMENT AREA OFFERS 2013 YELLOW STARThISTLE CONTROL PROGRAM

The Tulare County Weed Management Area (TCWMA) will treat small infestations (less than 10 acres) of YST in Tulare County with Milestone, a highly effective and selective herbicide that has proven to be effective for the control of Yellow Starthistle. The WMA is charging \$50 for the first 1 to 3 acres and \$15 per acre for more than 3 acres. To make arrangements call UC Cooperative Extension at 559-684-3300, 8 am to 5 pm Monday thru Friday. After business hours you may leave a message at 559-684-3317, and you will be called back. For more information contact Jim Sullins at 685-3309. Please indicate you are calling about Yellow Starthistle control. This program will be in effect through April, 2013. The priority for this project is for small YST infestations, less than 10 acre, and located above 600 foot elevation. Other sites may be considered based on time, size and location.

The TCWMA is an organization of cooperating agencies and landowner organizations that has been formed to reduce the increasing populations of noxious weeds in Tulare County; UC Cooperative Extension Tulare County is the lead agency.






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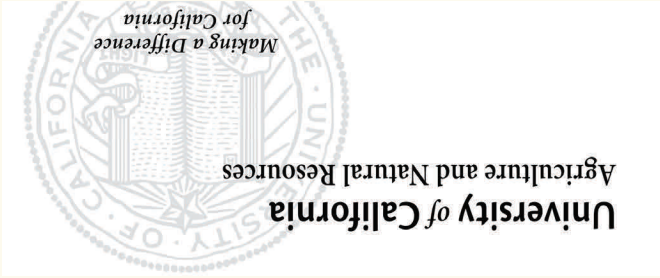
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