RANGE BULLETIN

Livestock & Natural Resources Newsletter

In this issue:

Editor
Rebecca Ozeran

Phone
559-241-6564

Email
rkozeran@ucanr.edu

Want more Livestock and Range information?

Find us on Facebook! Search for **@UCCEFresnoMaderaLivestock** or visit the page directly at **https://www.facebook.com/UCCEFresnoMaderaLivestock/** for weekly updates on upcoming events, recent news, and research information.

News Briefs

Check out these two new video series -

"Sheep Stuff Ewe Should Know"

Conversations with UCCE livestock advisor, Dan Macon

This weekly series covers a variety of sheep-related topics. To date, videos have covered COVID-19, economics, flock health, and guardian dogs.

Videos are posted weekly, available on YouTube here: **https://www.youtube.com/channel/UChmJnrOY-7XboaNe5fVXSQw/videos**

"Working Rangelands Wednesdays"

Hosted by UC Rangelands team based at UC Davis

This series covers a variety of range management topics. Most recently, the webinar series discussed rangeland water management. Sessions occur every other Wednesday.

You can register to watch the series live, here: **https://ucanr.edu/survey/survey.cfm?surveynumber=30292**

UC CE University of California Agriculture and Natural Resources Cooperative Extension

Summertime - blue-green algae time

By Gaby Maier, Extension veterinarian for beef cattle herd health and production and Josh Davy, County Director for Cooperative Extension Tehama County

August 2020

Blue-green algae, also known as cyanobacteria, can be found in surface water like ponds. These photosynthetic bacteria do not necessarily pose a threat and are actually part of the ecosystem that provides oxygen to other micro-organisms. Under certain conditions, though, a so-called algal bloom may lead to a dramatic increase in their numbers and their subsequent die-off releases toxins into the water. Warm weather, stagnant water, and nitrogen or phosphorus fertilizer runoff are risk factors that can result in these algal blooms. Some slow flowing creeks and rivers can also be impacted – every year the Klamath Rivers seems affected and Clear Lake is known to have had problems as well. Mild winds can push and concentrate blue-green algae on the water's edge. You will see scum, foam, or a mat of algae, or they can look like paint floating on the water surface. Their color can vary between blue, bright green, brown or reddish.

Blue-green algae produce two types of toxins, neurotoxins and hepato-toxins (liver toxins). Both types can lead to sudden death in cattle if they drink water from ponds where blue-green algae were blooming. Dogs playing in or drinking from ponds and other animals have also been affected. Exposed cattle can have bloody diarrhea, be weak or seem confused. Often the only sign is sudden death. Those animals surviving hepatotoxic toxin exposure can develop what is called photosensitization caused by liver damage, a term for describing that their skin is more sensitive to light, where the skin, especially the lighter areas like muzzle, teats, or vulva peels off.

This article continues ►

Algae cont'd

Blue-green algae toxicity is in any case a severe problem and ranchers should be on the lookout to avoid their cattle becoming exposed.

When you suspect a blue-green algae bloom, the best way to avoid problems is to prevent access to the water source by fencing off the pond and providing a different water source. Toxin levels will increase as the cyanobacteria die. Once the water has cleared up, the best way to assure the water is safe again is to test at the lab. Toxins likely distribute evenly throughout the water so pumping water from the bottom of the pond may not be safe. However, this can be a good method of prevention. Cattle standing in small ponds depositing nutrients can exacerbate conditions and lead to algal blooms. Smaller water bodies are more vulnerable, because a larger volume of water helps dilute the nutrient load, but large lakes and reservoirs are not immune and have been impacted as well. Diverting water from a pond to a water trough and then fencing off the pond can decrease the nutrient load and help prevent algal blooms. The Natural Resources Conservation Service (NRCS) can help cost share with this and other livestock water development projects.

How to know if you have blue-green algae

If you are in doubt whether you have blue-green algae in your pond, there are a few simple tests to distinguish them from normal harmless water plants or other types of algae. Wear gloves for all these tests to avoid contact with toxins. Thrust a stick onto a mat of algae and pick it back up – if it comes back looking like it has been dipped in paint, it is blue-green algae. If it comes back with threadlike algae dangling from it, it is a different type of harmless algae.

Another way to check for blue-green algae is to fill a mason jar or other clear container about ¾ with water and refrigerate overnight in a secondary container like a clear plastic bag to avoid any contact between the jar and other surfaces. Carefully inspect the next day; if all the algae are at the bottom, they are likely not blue-green algae. If they are floating at the surface, they are likely blue-green algae. These tests are not 100 % accurate but can be helpful in assessing the situation. If you identify blue-green algae in your pond, that does not necessarily mean that they pose a threat at that time. It does mean, however, that you should watch for algal blooms where toxins are released.

Testing at CAHFS lab is also possible. The lab offers an algae toxin panel, which is priced at $605 to test for 4 different toxins (Anatoxin-A, Cylindrospermopsin, Microcystins, Saxitoxins) or $165 for individual toxins. Testing requires 500 ml (about 1 ½ pints) of water that should be shipped on ice to the lab.
If one or more animals die acutely, it is important to consider a postmortem examination to try to determine if an algal toxin is the cause of death. The liver damage associated with exposure to hepatotoxic blue-green algae is dramatic and this can indicate the need to test for microsystins in water or gastro-intestinal content samples. The neurotoxic blue-green algae toxin does not cause any changes in organs after death, but gut contents can again be tested to help determine a cause of death.

How to manage blue-green algae

Copper sulfate is a way to treat the water and kill the algae but can lead to high copper levels in the water, which can be harmful to cattle. Sheep are particularly susceptible to copper toxicity. Any treated drinking source should be tested for copper levels prior to allowing sheep to consume the water after a copper sulfate treatment. It is important to follow label directions to ensure enough product is used to be effective, but not an excessive amount that can cause toxicity to animals. Bleach can also be a successful treatment. If a pond is treated it will be necessary to determine the volume of the pond, so the proper amount of product is applied. UC ANR Publication 8681 demonstrates a method for measuring pond volume. In addition, rapid die-off of algae can lead to large amounts of toxins being released into the water making it unsafe even though it appears clear. For this reason, and to ensure ample time for the product to work, livestock should be excluded from the treated water source until the treatment period is over.

This article continues ►

Algae cont'd

More sophisticated technical solutions are available but come with a price tag. Devices that emit ultrasound waves prohibit microscopic algae from floating to the water surface where algae need to spend time for photosynthesis, which is the plants' way of turning sunlight into energy. Blue-green algae will not survive without that energy source. Full systems adapt the emitted ultrasound frequencies according to an algorithm and monitor water quality in real-time alerting the user to any changes in algae levels. The advantages of this system are that the algal cells are not lysed and do not release their toxins into the water and no chemicals must be used that could be potentially harmful to non-target species. A ballpark figure is about $1,200 per surface acre for larger water bodies. Smaller, less sophisticated units are also available. The disadvantage of this system is that it is less effective in shallow water below 3-4 feet.

Mechanical aeration and mixing are other ways to decrease blue-green algae but require an electrical power source and systems maintenance. Mixing is more effective for deeper water bodies (> 45 ft).
Another thing to keep in mind is that cyanobacteria have been around for billions of years and know a thing or two about evolution. They can adapt to their environment, so whatever you do to control them it's important to stay a step ahead of them and not rely on the same method over time.

Fiddleneck and Popcorn flower: two native, but toxic, flowers

This article was written originally as a blog post on the UC Weed blog.

A few months ago, I was asked about the toxicity of various plants in a horse pasture after the death of a miniature horse using that pasture. While many of the identified plants were chemically harmless (such as filaree [*Erodium spp*] and some native clovers), the pasture did have fiddleneck (*Amsinckia spp*) and popcorn flower (*Plagiobothrys spp*), two native forbs with potentially toxic chemistry.

Fiddleneck (*pictured at left*) is a known alkaloid accumulator and popcorn flower is similarly suspected to accumulate alkaloids. There are no cases that I have found where popcorn flower was identified as a cause of toxicity. Most research on popcorn flower chemistry focuses on insect herbivores which eat plants with alkaloids to protect themselves against predation (e.g. Hartmann et al. 2004).

Alkaloids are secondary organic compounds produced by many plants. Different types of alkaloids have different interactions with animal biology, some of which are benign or beneficial, and others which are harmful. Some alkaloids you may have heard of include morphine, nicotine, and quinine. Pyrrolidizine alkaloids, the type found in fiddleneck and popcorn flower, have harmful effects. Toxicity often occurs when animals eat feed or hay contaminated with fiddleneck seeds, and there are some cases from animals grazing the plant.

This article continues ▶

Flowers cont'd

Fiddleneck alkaloids can cause liver disease and death of horses, cattle, and pigs, but sheep seem to be less vulnerable (Craig et al. 1985).

Both fiddleneck and popcorn flower (*pictured at right*) may also accumulate nitrates. Nitrates convert into nitrites once the animal eats the plant. Nitrites then react with hemoglobin in the blood and make it unable to carry oxygen. This oxygen deficiency can cause death in a matter of hours depending on the concentration of nitrates in the animal's diet. Sheep, pigs, and horses seem more resistant to nitrate poisoning while cattle are most vulnerable (Tucker et al. 1961).

How to avoid livestock poisoning by fiddleneck and popcorn flower

The best way to prevent livestock poisoning by these forbs is to make sure there is plenty of good forage available. Livestock don't typically seek out fiddleneck or popcorn flower. Fiddleneck and popcorn flower have more stem than leaf, so they aren't very palatable, and they are densely covered in hairs that tend to discourage grazing. In a pasture with plenty of grasses and desirable forbs, then, animals will easily avoid these harmful plants.

The risk of poisoning arises when there is little else for the animals to eat. As a pasture that has been overgrazed or a pasture experiencing a drought therefore might have too few plants for the animals to be able to avoid popcorn flower and fiddleneck. When possible, having more than one pasture can help keep animals safe. Animals should be moved out of pastures where the only available plants may be toxic.

Body size is also a factor in many cases of toxicity. A fully grown 1,000 -lb animal may be unaffected by a small amount of these toxins in their diet (such as the horse *pictured at left* who ate a big mouthful of grass and a single fiddleneck plant, right in front of me), while a young or small animal might become seriously ill after eating just a few plants. Whether an animal develops clinical signs of toxicity or poisoning depends on the concentration of toxin in the forage, the quantity of forage consumed, and the animal's size. However, any amount could be harmful and if you notice your animals are consuming toxic plants, please contact your veterinarian.

Can fiddleneck and popcorn flower be controlled?

You are not likely to eradicate them, but there are ways to control these plants if you are concerned about them. *This article continues* ►

Flowers cont'd

Both fiddleneck and popcorn flower can be hand-pulled – gloves recommended to protect against the hairs – if present in small patches. On small acreages, mowing an infested pasture before the plants produce seeds in the spring can help reduce the population. Some herbicides can also help kill these plants; generally speaking, you will need to apply herbicides when the plants are young and small, to prevent seed production for the year. Contact your local UCCE office for more specifics if you want to consider chemical treatments.

Long-term, re-seeding bare patches in pastures and ensuring moderate grazing can also help outcompete these species. Because they have relatively small leaves, popcorn flower and fiddleneck rely on plenty of sunshine to grow. As a result, they are less common in pastures that are densely populated by desirable forages which shade smaller plants.

For more on establishing a healthy pasture, even if you don't have horses, check out the free guide here: Establishing and Managing Irrigated Pasture for Horses (https://anrcatalog.ucanr.edu/Details.aspx?itemNo=8486).

*** If you are concerned that your animals may have been exposed to toxic plants, contact your veterinarian. If you have concerns about plants in your pastures, feel free to contact your local UCCE office for assistance with plant ID. ***

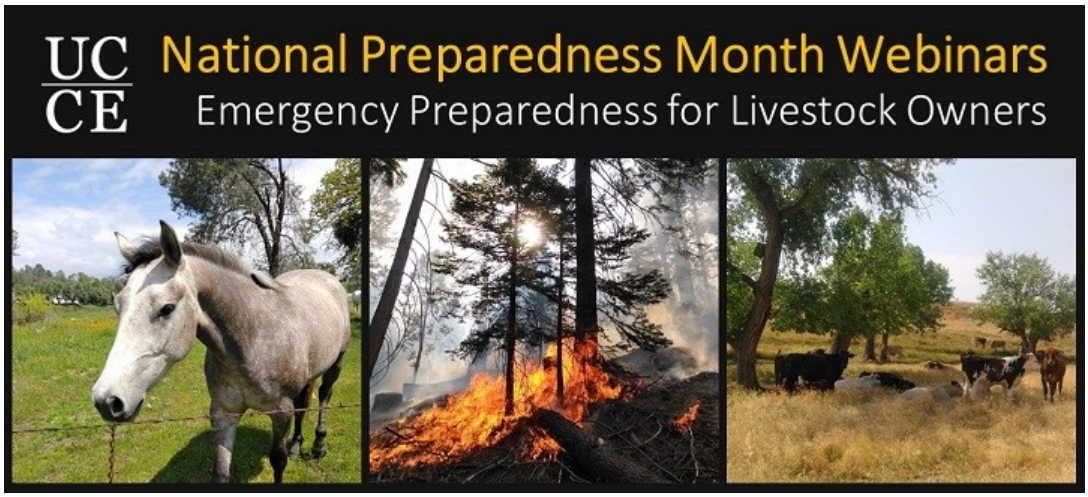
References:

Craig, A.M., L.L. Blythe, E.D. Lassen, and M.L. Slizeski. 1985. Resistance of sheep to pyrrolizidine alkaloids. Israel Journal of Veterinary Medicine 42:376-384.

Hartmann, T., C. Theuring, T. Beuerle, L. Ernst, M.S. Singer, and E.A. Bernays. 2004. Acquired and partially *de novo* synthesized pyrrolizidine alkaloids in two polyphagous arctiids and the alkaloid profiles of their larval food-plants. Journal of Chemical Ecology 30(2):229-254.

Tucker, J.M., D.R. Cordy, L.J. Berry, W.A. Harvey, and T.C. Fuller. 1961. Nitrate Poisoning in Livestock. California Agricultural Experiment Station. Circular 506, 12p.

Pictured at right: a field in spring of 2020, thickly populated by fiddleneck (background) and popcorn flower (foreground).



Check out our two-part webinar series for National Preparedness Month:

Sep. 2: Leaders in Emergencies - Get to know who manages emergencies locally and statewide. Agenda and registration are available here: **https://ucanr.edu/prepmonth2020**

Sep. 9: Wildfire Preparedness - Find out how best to protect your family, animals, and buildings against wildfire, and get to know people who can help you prepare your property. Agenda and registration are available here: **https://ucanr.edu/fireprep2020**

Publication Corner

In each issue, this newsletter highlights two to three example publications from our catalog. To view all UC publications, visit: https://anrcatalog.ucanr.edu/

The Benefit of Livestock Grazing California's Grasslands***, 2015

Excerpt: Livestock grazing is the most effective, efficient way to manage California's grasslands on a landscape scale, particularly when the land is managed with conservation objectives in mind. It is a useful buffer against development (and, against loss or fragmentation of habitat) and a practical way to enhance native biodiversity.

Download here

Selling Meat and Meat Products***, 2004

Excerpt: Before you can legally offer domestic meat and meat products for sale, the animal must be slaughtered in a facility inspected by U.S.D.A.'s Food Safety and Inspection Service. Products processed from USDA-inspected carcasses must be handled in an inspected facility, depending upon the type of product and the intended customer. This publication provides an overview of the meat and poultry inspection system in California.

Download here