

### In this issue:

News briefs

Mushroom Poisoning

Non-lead Ammunition

Livestock Carcass  
Composting Field Day

Weed Management Book  
Sale



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Missed a previous session (October and/or December)? You can watch the recordings and other poultry videos on Maurice's YouTube channel: [youtube.com/c/UCDavisVetMedPoultryUniversity/videos](https://youtube.com/c/UCDavisVetMedPoultryUniversity/videos)

## Mushroom poisonings – a danger to cattle?

By Dr. Gabriele Maier, UCD Beef Cattle extension veterinarian and Dr. Robert Poppenga, CAHFS toxicology section head

The atmospheric river event in October of 2021 followed by mild temperatures in northern California turned many grasslands green but may have also resulted in advantageous growing conditions for many types of mushrooms. Different species of mushrooms have a particular growing season between fall and spring, but overall, they require moisture to grow, which we now finally have. If you encounter lots of mushrooms where cattle graze, you may wonder whether they can pose a danger to your livestock. As with many other poisonous plants (although mushrooms are technically not plants), cattle will avoid them if other food sources are available, but occasional accidental ingestions can occur, and it doesn't take much to cause problems.

There have been two documented cases of mushroom poisoning in beef calves in California a few years back in 2008 and 2009. In both calves that died from mushroom poisoning, amanitin, the toxic substance that is found in three different genera of mushrooms *Amanita*, *Galerina*, and *Lepiota*, was detected. The calves were from Sonoma and Napa counties and both were found dead without any previous signs of illness.

The most common species of amanita containing poisonous mushrooms along the West Coast are *Amanita phalloides* (Death Cap) and *Amanita ocreata* (Destroying Angel). Death Cap is common in the San Francisco Bay area and along the Pacific Coast and is abundant in warm, wet years. It is found close to oak, birch, and pine trees, but can also be found in open pastures in the Central Valley. The Destroying Angel occurs all the way from Baja California along the Pacific coast to Washington and is commonly found in the foothills and valley floor of California's Central Valley.

Poisonings from amanitin have also occurred in people, dogs, and horses. The poison is extremely potent, and one or two Death Caps could kill an adult cow or horse. The toxic mechanism for amatoxins is the blocking of RNA polymerase, an enzyme necessary for producing messenger RNA, ultimately required for protein synthesis. Liver and kidney cells have a high metabolic rate and are particularly vulnerable to this toxin, which leads to necrosis in these organs. Liver necrosis was noted on both calves that fell victim to the poisonous mushroom ingestion, which is a typical finding also in blue-green algae poisoning, cocklebur ingestion, or copper toxicosis.



*Amanita phalloides* (Death Cap) photo © [Ran-DL](#), under [Creative Commons licensing](#)

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*Mushrooms Continued***What should you do if you suspect poisonous mushrooms growing in your fields?**

There are field guides that can help identify mushrooms, but this is not a trivial endeavor. Many mushrooms look very similar to each other so making an identification based on an online photo is difficult. Local mycologists or mushroom hunters may be able to help. Another idea is to use a phone app called iNaturalist where users upload pictures of organisms and other users, many of whom are scientists, help identify them. The app is a joint initiative of the California Academy of Sciences and the National Geographic Society where all users may help contribute to the identification of uploaded plants, animals, or fungi. There is no guarantee that the app will provide an accurate identification, but it will allow the user access to many enthusiasts and professional botanists and zoologists and certainly presents an improvement over using a picture guide.

Finally, there is a test kit available that identifies amatoxins in small amounts of mushroom tissue or urine of an animal that is suspected of having consumed the poisonous mushrooms. The test is less sensitive than lab testing at CAHFS, so negative results have a chance to be false. The kit was developed by the USDA Agricultural Research Service and costs \$45 for 3 tests or \$205 for 15 tests. Unfortunately, due to high demand, the kits are sold out at the moment, but should be available again in early 2022 from this site: [amatotest.com/](http://amatotest.com/). If the mushrooms you found are identified as poisonous, it is best to pull them out and discard them. To avoid any contact with the mushrooms, wear gloves and wash your hands after handling them.

**What should you do if you suspect mushroom poisoning in cattle?**

As always when encountering sudden death in livestock, contact your veterinarian to discuss the case and get help with identifying the cause. There are many causes of sudden death in cattle and a good history combined with a field necropsy is the best strategy to get to the bottom of it. If no obvious cause can be found and you have observed mushrooms where the animal was grazing, collect some of them and submit together with the carcass or tissues to the diagnostic lab. Taking a close-up focused picture of the mushrooms may also be helpful in making a diagnosis. Toxicological tests are necessary to confirm a diagnosis and the best tissues to submit are rumen content, liver, kidney, and urine. However, to be able to rule out other causes, additional tissues or the entire carcass should be submitted.

Unfortunately, there are no specific treatments or antidotes for these types of poisonings. Supportive care to help an animal clear the toxin from its system is all that can be done for surviving animals with suspected mushroom poisoning.

The chances of mushroom poisonings in cattle are certainly slim, but they should be on your radar if nothing else seems to make sense, especially when conditions are right for mushrooms to grow.

*If you have unexplained livestock mortality, you can submit samples to one of the CAHFS labs (Davis, Turlock, Tulare, San Bernardino). The process to submit samples and cost estimates for toxicology and other diagnostics are listed on their website: [cahfs.vetmed.ucdavis.edu/](http://cahfs.vetmed.ucdavis.edu/).*

# The Importance of Using Non-lead Ammunition

*Contributed by Matthew Parker, Non-lead Outreach Specialist, Institute for Wildlife Studies.*

The habitat and resources that ranchers provide to wildlife form the deeply intertwined roots of ranching and conservation. Another way that ranchers can deepen their conservation roots is by using non-lead ammunition whenever dispatching an animal with a firearm is required. Situations may arise that require the use of a firearm such as depredation, vertebrate pest removal, or dispatching old or sick livestock. The type of bullet used to dispatch an animal can have lasting consequences on the landscape. If lead-based ammunition is used to dispatch an animal even something small like a ground squirrel, then it becomes a potential pathway of lead exposure for any organism scavenging on the remains of that animal. Using non-lead ammunition benefits scavenging wildlife by providing a healthy, nutritious, and lead-free food source.

## The Biology

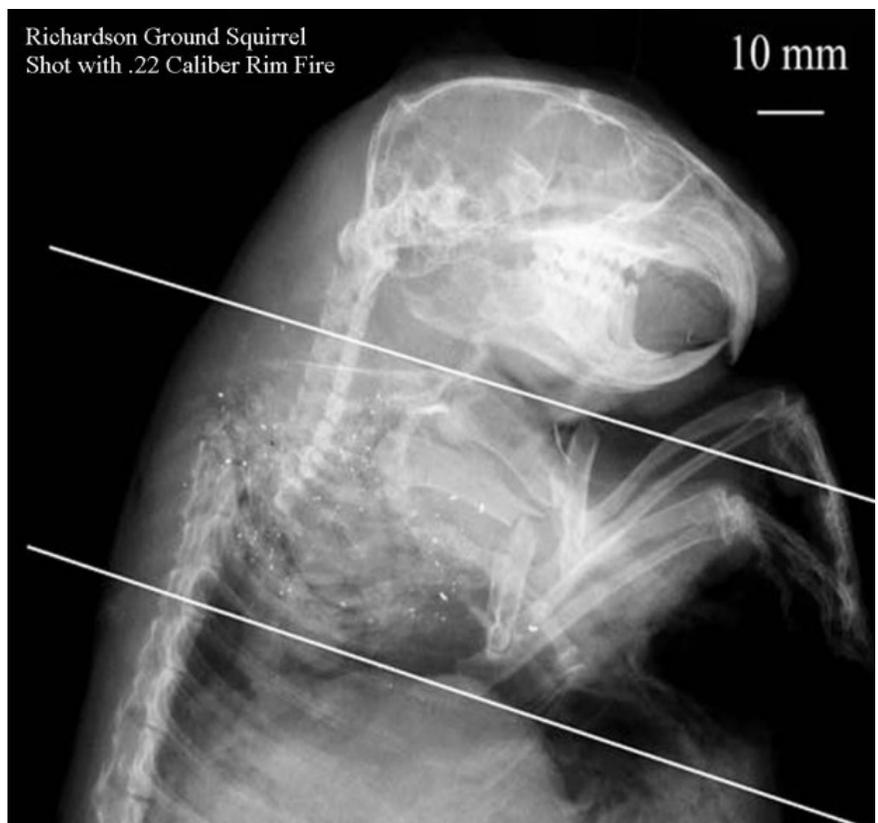
Working in California's Central Valley, it can be easy to forget that you're also in one of the most biodiverse states in the country. Some of the more common critters you may see are scavengers like the turkey vulture, common raven, yellow-billed magpie, and a plethora of raptor species. These are the animals that keep our landscapes clear of dead and decaying organisms, called carrion. These are also the animals most likely to suffer from lead exposure when lead bullets are used to dispatch wildlife.

In 2019, California became the first state to require non-lead ammunition to dispatch animals with a firearm. Two years after implementation, lead poisoning cases are still prevalent in California scavengers. What does this mean? Lead ammunition is still being used to some degree in California and scavengers are getting exposed to it. Why does this matter? Scavenging wildlife provide a tremendous environmental service by eating carrion, resulting in lower rates of disease and less decaying organisms on the landscape. Furthermore, many opportunistic scavengers like Swainson's or red-tailed hawks, provide additional services to agricultural communities by consuming rodents and other pestilential species.

The reason that lead-core bullets are so problematic to scavengers is because lead bullets will fragment when they travel at fast rates of speed and make contact with a solid object like an animal. Even in small calibers like .22lr, hundreds of lead fragments can result from a single bullet. The image at right is a radiograph of a Richardson ground squirrel dispatched with a .22 caliber lead-core bullet that illustrates the magnitude of fragmentation.

Another issue with lead fragments is that smaller pieces are more problematic because they have a greater surface-area to volume ratio. What this means is that they dissolve more easily in the highly acidic environment of a scavenger's stomach.

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*Non-lead continued*

If a scavenger were to consume this squirrel, there is a strong likelihood that animal would ingest lead. However, if the shooter chose to use a non-lead bullet, then a scavenger could enjoy a safe and healthy meal, while not being at risk of suffering from lead poisoning.

**The Ballistics**

Non-lead ammunition is accurate and effective. There is a considerable amount of variety for non-lead ammunition. Knowing the different options and how they perform can encourage more of their use. For large caliber rifles, a monolithic copper or copper alloy projectile (pictured at right) is the main alternative to lead.



There are notable differences between copper and lead bullets and understanding these can help you be a more competent shooter. Copper is less dense than lead, so to compensate for this disparity manufacturers lengthen copper bullets to achieve equal weights. Dropping the grain weight of a solid copper bullet by 15-25% of what you typically used with lead is recommended to experience similar performance. A lighter bullet may not seem desirable, however solid non-lead bullets retain much greater levels of weight and are typically moving faster; as a result, the energy deposited into the animal is typically greater.



Similarly, rim-fire or small caliber firearms have had a lot of advancement with non-lead alternatives. Several non-lead metal materials are being utilized by manufacturers including copper, tin, zinc, and various alloys combining these metals. Beyond materials, different bullet designs can offer the shooter specific performance attributes that may be desirable over lead. One example is a frangible bullet, highly effective for depredation or pest removal but not recommended for game you wish to consume. Frangible rounds are composed of a compressed copper powder matrix that produce a shallow but devastating wound channel with rapid expansion. A frangible round (pictured at left) offers a quick and humane kill and the powdered copper left in an animal does not pose a threat to scavengers that consume it.

**The Future**

Non-lead bullets are an advancement of bullet technology and offer more options than has ever been available. Choosing to use a non-lead bullet is the right choice for individuals who want to further illustrate their commitment to conservation while not sacrificing on the performance of the tool. There are always challenges that could infringe this choice, such as a stockpile of lead-core ammunition or trouble finding non-lead in your caliber. These are real challenges, but they are worth overcoming for the benefit to wildlife and conservation. If you have questions, need help finding non-lead ammunition or would like to know more, we encourage you to check out [huntingwithnonlead.org](http://huntingwithnonlead.org).

## Livestock Composting Field Observation Day - Tulare, CA February 15, 2022

CDFA has been working on a multi-year effort to bring the University of Maine Livestock Compost School to California. Livestock composting is being evaluated as an emergency alternative for mortality management when rendering is unavailable or cannot be used, such as during an emergency animal disease outbreak or a heatwave event where mortality outpaces rendering capacity.

**CDFA is hosting a field observation day in Tulare, in-person, at the UC Davis Veterinary Medicine Teaching and Research Center located at 18830 Road 112, Tulare, CA 93274.**

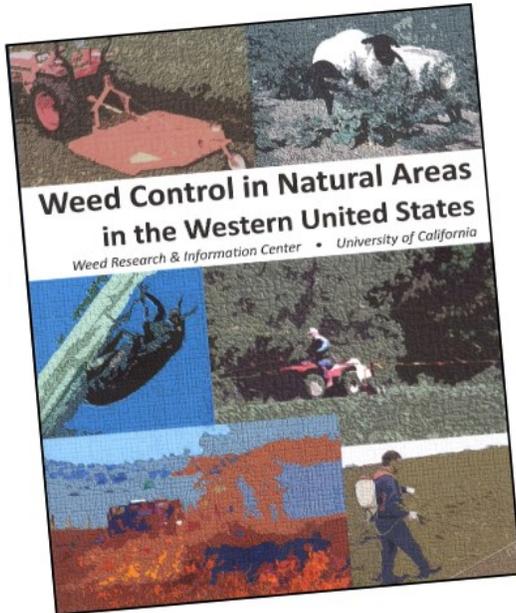
**Registration is available here:** [extension.umaine.edu/register/product/emergency-response-carcass-management-information-and-demonstration-field-day-california/](https://extension.umaine.edu/register/product/emergency-response-carcass-management-information-and-demonstration-field-day-california/). Password: ca2022

We encourage local leaders to attend to observe how grinding, composting, and above ground burial may be used as tools for mortality management. Participants will have the opportunity to interact with compost subject matter experts that have been deployed during numerous catastrophic events and have been leaders in carcass management research and educational programs.

This event is being coordinated with the California Department of Food and Agriculture and UC Davis. CDFA is coordinating this event with other local and state regulatory agencies. The event is sponsored by the USDA National Animal Disease Response Preparedness Program.

For more information about the training, contact Mark Hutchinson at [mhutch@maine.edu](mailto:mhutch@maine.edu) or 207.832.0343, Andy Femino at [andy.femino@cdfa.ca.gov](mailto:andy.femino@cdfa.ca.gov), Jessica Diez at [jessica.diez@cdfa.ca.gov](mailto:jessica.diez@cdfa.ca.gov), or Han Lai at [han.lai@cdfa.ca.gov](mailto:han.lai@cdfa.ca.gov). If you need a reasonable accommodation, please contact Pamela Doherty at 207.832.0343 at least 10 days before the program. If requests are received after this date, we may not have sufficient time to make necessary arrangements.





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