



Extension

UNIVERSITY OF WISCONSIN-MADISON



# Equine Toxicity Concerns due to Blister Beetles

- Poisoning by blister beetles is rare
- All hay can potentially contain blister beetles, but alfalfa hay has a greater risk
- Alfalfa blossoms can serve as a food source for adult blister beetles
- Blister beetles contain cantharidin, a burning agent or poison
- If equine and/or livestock animals display signs of toxicity, stop feeding your current hay source and contact your veterinarian immediately for diagnosis and treatment options
- Onset of toxicity symptoms can take a few hours to days
- Contact UW's Insect Diagnostic Lab for insect analysis

## What are Blister Beetles?

Blister beetles, known as meloids to entomologists, are insects that naturally contain a toxin, known as cantharidin. Stored within their bodies it can cause blistering of human skin, or the intestinal tracts of animals that ingest blister beetles<sup>1,2,3</sup>. Poisoning caused by blister beetles is rare, but being aware of these insects and their potential impacts is worthwhile for owners of horses or other livestock.

Cantharidin, a burning agent or poison, is produced within the reproductive systems of male blister beetles and production is stimulated due to copulation<sup>2,4</sup>. During this time, males transfer the cantharidin they produced to the female blister

beetle<sup>2,4</sup>. Due to this production and transfer, there is variation of cantharidin concentrations across sexes of blister beetles with female blister beetles containing lower concentrations of cantharidin compared to their male counterparts<sup>2</sup>. There is also a variation in cantharidin concentrations across species of blister beetles<sup>3</sup>.

Blister beetles' range in size from 3-70 mm<sup>5</sup>. Blister beetles have a cylindrical shape, distinctive cranial neck, and have many different color variations depending on species<sup>5,6</sup>. PJ Liesch, University of Wisconsin – Madison (UW) Entomologist and Director of UW's Insect Diagnostic Lab, also notes that blister beetles are not particularly hard or crunchy as they have a somewhat softer exoskeleton, similar to fireflies.



**Figure 1** Blister beetles for size reference<sup>7</sup>.

Nearly 30 species of blister beetles have been documented in Wisconsin with most of these species feeding off ground nesting bee larvae<sup>6</sup>. While twenty-eight species of blister beetles may seem high, there are nearly 400 species of blister beetles documented within the United States, according to

Liesch. Each species varies in terms of where and when adult blister beetles are active around the United States<sup>3</sup>. According Liesch, *Epicauta*, *Lytta*, and *Meloe* are some of the most common genera of blister beetles found in the Midwest and around the country.

### Where are Blister Beetles Found?

Blister beetle larvae live in the ground and feed off both nesting bee larvae and grasshopper eggs<sup>2,3,8</sup>. Adult blister beetles can feed on alfalfa blossoms and many other plants<sup>3</sup>. While it is possible for blister beetles to be present within grass hay, it is much more common for blister beetles to be found in alfalfa hay as alfalfa blossoms can serve as a food source for the adult blister beetles. Blister beetles have also been found on tomatoes, potatoes, beets, lima beans, and other garden vegetables within the United States<sup>9</sup>. Additionally, blister beetles have been observed throughout Wisconsin on black-eyed Susan, native sunflowers, rosinweed, and prairie coreopsis, and other plants<sup>6</sup>.

### Examples of blister beetles found within Wisconsin



**Figure 2** Picture 1 - *Epicauta cinerea*<sup>6</sup>,  
Picture 2 - *Gnathium minimum*<sup>6</sup>,  
Picture 3 - *Tricrania sanguinipennis*<sup>6</sup>,  
Picture 4 - *Zonitis vittigera*<sup>6</sup>.

Blister beetles are found in every state across the United States and in parts of Canada, Mexico, and Central America<sup>6,10</sup>. Additionally, blister beetles are typically found in clusters or aggregations causing variable incorporation of blister beetles into hay<sup>2</sup>.

### Blister Beetles and Equine

Blister beetle toxicity in equine has been documented since the 1960s<sup>11</sup>. Since concentrations of cantharidin range across species and sexes of blister beetles, it is challenging to determine how many blister beetles equine need to ingest before experiencing toxicity<sup>2</sup>. The minimum lethal dose of cantharidin is estimated to be  $\leq 1$  mg/kg<sup>2</sup>.

**Table 1** Estimated number of blisters beetles consumed for a lethal (1 mg/kg) dose of cantharidin in equine<sup>2</sup>.

Cantharidin content of a blister beetle (mg)	Equine Weight (lb)	
	550	1000
1	250	455
2	125	244
3	83	161
4	63	122
5	50	97

Possible signs of toxicity within equine include:

- Acting like they are colicky, in shock, have depression (depressed equine tend to have lowered heads)<sup>3,11</sup>
- Frequently drinking small amount of water or keeping their muzzle submerged in water (this helps soothe lesions or blisters on the lips and within the mouth)<sup>3,12</sup>
- Frequently attempting to void urine<sup>12,13,14</sup>
- Profusely sweating or showing symptoms of gastric ulcerations or abdominal pain<sup>3</sup>
- Experiencing loss of appetite, weight loss, diarrhea, increased heart rate or body temperature, and laminitis<sup>12</sup>



**Figure 3** Horse resting their muzzle in water to soothe muzzle and mouth blisters<sup>15</sup>.

The onset of symptoms can range from hours to days<sup>3,11,12</sup>. If you notice signs of blister beetle toxicity, contact your local veterinarian immediately.

### **Tips for Hay Producers**

Scout for blister beetles in alfalfa fields during second, third, and consecutive growths as well as new seedings<sup>16</sup>. Scouting is not needed during the spring growth as the alfalfa has not yet blossomed<sup>16</sup>.

Cut alfalfa before blossoms begin, to deter blister beetle attraction. As mentioned before, adult blister beetles can be attracted to alfalfa blossoms as a food source. Cutting alfalfa before flowering will decrease the amount of food available to blister beetles and will deter them from that specific area.

Avoid crimping as hay crimping and/or conditioning crushes blister beetles<sup>2</sup>. While this kills the blister beetles, their carcasses are then incorporated into the bales<sup>2</sup>. If hay is not conditioned or crimped, beetles are able to disperse before baling occurs<sup>2,17</sup>. It is important to note that cantharidin can still be found within the carcass of the blister beetle for months after the beetle dies<sup>17</sup>.

Scout your field frequently for blister beetles if you are growing alfalfa near rangeland. Rangeland supports grasshoppers, in turn supporting blister beetle larvae<sup>2</sup>.

If you see blister beetles within your fields, contact your local agronomist to discuss the appropriate insecticide. It is important to note that not all states have the same guidelines for insecticide application.

Additionally, it is important to note that spraying an insecticide directly onto alfalfa fields could cause the blister beetle to die within the field and become incorporated into hay bales. You may want to consider cultural responses, such as controlling primary weeds in and near alfalfa fields and directly controlling for grasshopper populations, as an alternative to chemical responses.

### **Tips for Hay Buyers**

Grow your own hay or purchase hay from producers you trust. However, this is not always an option. If you need to purchase hay for your equine, or other animals, purchase first-crop hay when possible. Incorporation of blister beetles will likely be lower in first-crop hay compared to consecutive crops as there is less likely to be alfalfa blossoms to attract adult blister beetles to the first crop hay.

When purchasing hay from producers you do not know, consider testing your hay for presence of blister beetles. Contact your local extension educator, veterinarian, or Liesch at UW's Insect Diagnostic Lab to test hay for blister beetles.

Routinely examine flakes of hay before feeding.

### **What to do if Equine Toxicity is Suspected**

If equine display signs of cantharidin ingestion, immediately stop feeding your current source of hay and contact your local veterinarian.

Before feeding the same hay source, collect a hay sample for further insect analysis. To collect an insect sample from hay sources, lay a white or light-colored sheet or tarp on the ground. Shake hay flakes or samples over the sheet or tarp, catching the dislodged insects onto the tarp or sheet. Next, collect all insects (whole and crushed insects) and place in a hard-sided container. Take caution while collecting samples by avoiding contact with skin and mucous membranes.

Once you have a sample of insects, contact your local Extension educator or entomologist.

If you are not feeding square bales, consider taking many cores throughout the round bale and shaking those out over a light-colored tarp or sheet.

### What to do with Infested Hay

If the blister beetles within your infested hay have moderate or low levels of cantharidin, you could consider feeding the hay to healthy equine and/or other animals<sup>2</sup>. While this may seem alarming, moderate levels of blister beetles that contain low levels of toxic cantharidin may not induce toxicity symptoms. Prior to feeding infested hay, regardless of cantharidin level, contact your local veterinarian to discuss potential feeding options and/or concerns.

If you choose to feed infested hay, watch your animals for signs of toxicity. If toxicity symptoms are observed, contact your local veterinarian immediately. If you do not want to feed any infested hay, consider burning or burying it. This will prevent exposure of cantharidin to other animals.

### Just Equine?

Blister beetles have caused documented human health cases ranging from skin blisters, fever, shock, and abdominal pain to myocardial necrosis<sup>12,18,19</sup>. Myocardial necrosis is death of heart tissues, which can be observed after a heart attack. It is not uncommon for hay producers to squish a blister beetle that crawled under their clothing, producing a blister on their skin. The lethal dose of cantharidin for humans is estimated to be <1 mg/kg<sup>2</sup>.



**Figure 4** Human blistering as a result of smashing one blister beetle on the neck<sup>20</sup>.

Humans and equine are not the only animals negatively influenced by cantharidin. The lethal dose of cantharidin is estimated to be 1.0 – 1.5 mg/kg for feline and canine and 20 mg/kg for rabbits<sup>3,21</sup>. Sheep, goats, poultry, cattle, and rats have also exhibited cantharidin toxicity from ingestion of blister beetles within alfalfa hay<sup>3,23,24</sup>.

When compared to other animals, equine tend to have a greater response or reaction to blister beetles. The reason for this is unknown.

### For More Information

Contact your local Extension Educator; local veterinarian; forage testing facilities; or Liesch with UW's Insect Diagnostic Lab at pliesch@wisc.edu or (608) 262 - 6510. Additionally, Dr. Darlene Konkle, Wisconsin State Veterinarian, can be contacted at darlene.konkle@wisconsin.gov or (608) 224 - 4884 and Dr. Keith Poulsen, Director of Wisconsin Veterinary Diagnostic Laboratory, can be contacted at keith.poulsen@wvdl.wisc.edu or (608) 262 - 5422.

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