GAYLE STRICKROOT

Muscular activity generates a great deal of heat that the body must eliminate. Watch exercising horses closely and help them cool and rehydrate as needed so they don't reach exhaustion.

Managing Emergencies

ERICA LARSON

Managing Dehydration, Exhaustion

Horses can lose up to 15 liters of sweat per hour during strenuous exercise, leaving them in a precarious metabolic balance that cold water hosing alone can't touch. Emma Adam, BVetMed, Dipl. ACVIM, ACVS, a practitioner performing research at the University of Kentucky Maxwell H. Gluck Equine Research Center, described ways veterinarians can manage severe dehydration and exhaustion.

Signs that a horse is approaching or has reached severe dehydration include:

- Excessive sweating (and associated electrolyte and isotonic fluid loss);
- A lack of perspiration (the horse has stopped sweating in spite of continued exercise and hot ambient conditions);
- Gastrointestinal (GI) tract dysfunction, including minimal gut sounds, no manure being passed, or loose stool;
- Anxiety and muscle twitching or, in severe cases, a lack of responsiveness;
- Synchronous diaphragmatic flutters (commonly called "thumps,");
- Rhabdomyolysis (tying-up); and
- Kidney dysfunction.

She noted that in severe cases, laminitis can be a possible consequence.

Adam said if she sees horses exhibiting a combination of severe dehydration and any of the aforementioned signs, typically she considers them exhausted.

If the horse is mid-workout when a rider notes signs of problems, he or she should stop exercise immediately and turn attention to cooling and rehydrating the horse.

Remove all tack, blankets, wraps, etc., and apply "copious volumes" of cold water all over the horse; if necessary, use ice water or add isopropyl alcohol (rubbing alcohol) to the icy water, which helps to cool it more efficiently. Adam stressed that the handler should scrape water off immediately, reapply, then scrape it off again to prevent it from becoming an insulator as it warms. Use fans to help cool the horse or bring the horse into a shady area.

Adam said one of the first things a veterinarian should do is place an intravenous (IV) catheter in one or both jugular veins to facilitate IV fluid therapy. Bear in mind that some severely dehydrated horses might require up to 60 to 80 liters of fluid over a six- to 12-hour period to effectively rehydrate. Her first choice for IV fluid is 0.9% normal saline with added potassium and possibly calcium, but any polyionic isotonic fluid will work. Permit the horse to drink if he desires, but monitor the GI tract closely to ensure gastric reflux does

COURTESY REBECCA GIMENEZ

Horses that survive barn fires can suffer burns to their skin, eyes, and respiratory tract.

not occur due to related exertional ileus (lack of gut motility). Exertional ileus is a common side effect of dehydration and exhaustion that typically resolves when fluid and electrolyte balances return to normal.

A dehydrated horse could have other internal problems (e.g., renal damage) that influence prognosis. Adam advised veterinarians to refer horses to a hospital when:

- They do not urinate after receiving roughly 40 liters of IV fluid;
- They develop respiratory distress, cardiac arrhythmias, or signs of colic; and/or
- They do not respond to therapy after several hours.

Most horses recover well from dehydration and exhaustion, Adam concluded. Complications typically do not hinder recovery, although life-threatening conditions such as multi-organ failure and laminitis can occur in serious cases.

Barn Fires: The Veterinarian's Role

A barn engulfed in flames, terrified whinnies coming from inside. Few scenarios are more frightening to owners of stable-kept horses. Practitioners, with their regular trips to the barn, are in a unique position to advise owners on fire prevention. It's impossible to eliminate any possibility of a barn fire, but Adam said "fireproofing" barns can decrease the likelihood of a devastating fire igniting and can reduce insurance premiums by 5 to 10%.

If owners are planning/building a barn:

- Consider having stall doors that open to both the aisle and exterior of the barn;
- Ensure there are enough electrical outlets to service the number of stalls; and
- Reduce the amount of wood used in barn and stall construction.

In existing barns:

- Ensure barn and stall doors are in good repair and open easily;
- Conduct regular checks and maintenance on electrical outlets and wiring.
- Pile manure away from the barn;
- Remove dust, debris, and cobwebs, especially around electrical equipment;

> **"When called to a barn fire, take instruction from the fire department's on-site leader."**
>
> DR. EMMA ADAM

- Remove accumulating flammable material, such as hay waste or bailing twine;
- Install heat and/or smoke alarms and a sprinkler system, if possible;
- Install lightning rods;
- Keep a functional fire extinguisher handy and know how to use it;
- Make sure everyone who frequents the barn understands fire safety and fire extinguisher use; this might mean translating guidelines into other languages;
- Avoid storing hay/straw in the barn; and
- Avoid storing fuel-filled vehicles near livestock.

Even with the strictest safety precautions, fires still occur. Affected horses can suffer burns to their skin, eyes, and respiratory tract, along with more severe consequences such as shock and internal organ failure. Immediate veterinary care is crucial to improve horses' chances of survival.

Practitioners treating victims at a fire scene must stay calm, focused, and safe.

"When called to a barn fire, take instruction from the fire department's on-site leader," she said. "Treat the horses that have already been removed from the fire, and do not enter the barn fire area."

Take a moment to assess the situation:

- Where are horses located relative to the fire? Will burns be the major concern? Will smoke inhalation or carbon monoxide poisoning be significant issues?
- What materials burned? Could horses have inhaled toxic fumes or substances?
- How stable is the barn structure? Have horses been struck with falling debris?

These factors could help veterinarians provide the most appropriate triage care before referring patients to a hospital for further evaluation and treatment, she said.

The key to dealing with barn fire victims is to treat each horse immediately and aggressively, Adam said, as if you're addressing serious shock. There's often latent damage, both inside and outside of the horse's body that's not evident initially.

"The mainstay of initial therapy is cardiovascular stabilization," Adam said. Veterinarians should place a long-term IV catheter in the patient's jugular vein and start fluid replacement therapy quickly, before tissue edema (fluid swelling) hampers vein access. In addition to isotonic fluids, she suggested administering hypertonic saline solution but noted that—if available—frozen plasma can be used as well.

Note that many horses might require a temporary tracheostomy immediately due to facial burns or laryngeal swelling.

Next, Adam said, consider administering the diuretic furosemide; many practitioners believe diuretics offset the risk of potentially fatal pulmonary edema (fluid buildup in the lungs), she said. Using furosemide in this scenario is controversial in human medicine, she said, but "I use it because I've seen what happens without it." The only way to diagnose equine pulmonary edema in the field is to watch for

a pink froth at the nostrils, she explained. Unfortunately, there is little that can be done to help the horse once this happens.

Adam said she also would administer a low dose of short-acting, rapid-onset corticosteroids to help stabilize horses' cell membranes. Some veterinarians use antimicrobials—both topically on burns and systemically—to help protect horses from environmental bacteria, she explained. It's also typically beneficial to administer anti-inflammatory and/or analgesic drugs—such as flunixin meglumine or phenylbutazone (Bute)—after starting fluids, she said.

After care at the scene of the fire, the veterinarian should refer horses to a hospital for further treatment. It's difficult to provide a prognosis—or an estimate on treatment cost—after initial care, since it can be tough to know the extent of cutaneous, ocular, and systemic organ damage.

Veterinarians responding to barn fires must often decide if euthanasia is the most humane course of action for severe cases.

Overall, treat each case individually and, most importantly, she said, "Stay safe."

Medication Mishaps in Horses

Try as they might to avoid them, veterinarians will manage medication mishaps, whether they or a tech inadvertently reached for the wrong drug or an owner administered an inappropriate medication. Adam explained how practitioners should handle such scenarios and listed precautionary measures to take.

Adverse drug reactions (ADRs) generally fall into one of two categories: idiosyncratic (reaction is unpredictable, might or might not recur in a given individual, and/or might become worse with repeated exposure, such as allergic reactions or hypersensitivity) and dose-related.

Adam said most drugs used in equine veterinary medicine can produce an ADR if not used carefully. Many can be toxic even if given at doses, frequencies, and durations necessary to effect a cure in the horse. And possible side effects aren't limited to systemic reactions; for instance: horses can develop skin irritation at administration sites, whether they're oral, intramuscular (IM), or IV. Giving even seemingly common and innocuous medications such as Bute and flunixin meglumine can have serious consequences. Both can damage the stomach and kidneys if not monitored properly; Bute is not licensed for IM injection and causes "massive tissue sloughs" if given IM; and flunixin meglumine—if given via an IM injection—can cause extensive tissue damage, infection, and even clostridial myonecrosis ("gas gangrene").

Clinical signs of an ADR vary, but they commonly include hives, diarrhea, swelling in all four limbs, or petechiation (small purple spots on mucous membranes). In the event of an ADR, the first step is to stop administering the drug believed to have caused the reaction. Then, she said, "it is essential to communicate about the situation calmly with the owner. Be transparent, be honest, and carry on formulating a plan to treat the horse."

Veterinarians should report any ADRs to the drug manufacturer. "Drug companies go to great trouble and expense to get products safely on the market," she said. "However, testing the product is obviously not possible on a limitless number of animals and, as such, it is our responsibility to help with this process."

She also touched on accidental overdoses, noting that inappropriate dosing is not uncommon in veterinary medicine, "but a lot less common than in human medicine."

Accidental administration of the wrong drug Veterinarians must remain calm and focused and inform the owner about what is transpiring or what has occurred in these cases. They should gather as much information as possible about a situation in which they, their tech or assistant, or the owner gives the wrong drug before proceeding. In some cases veterinarians should seek help from other sources if they're unsure how to best proceed.

Follow-up care depends on the drug administered and subsequent health risks posed, if any. Some cases require support such as fluid therapy, drug reversal agent administration, and/or additional drugs to return the horse to normal, she said. Each drug requires different protocol.

STEPS TO PREVENT MEDICATION MISHAPS

While we can't eliminate mistakes completely, Emma Adam, BVetMed, Dipl. ACVIM, ACVS, offered some suggestions for veterinarians that could help reduce the number of medication mishaps that arise:

- Be familiar with different drugs' physicochemical properties, and know when each should and should not be used;
- Arrange medications in cabinets or drawers thoughtfully and carefully;
- Add harmless dyes to certain clear liquids, such as mineral oil or rubbing alcohol, so you can quickly tell which one is which;
- Keep medications with similar appearances but different functions in separate areas;
- Consider labeling medication jars using tape and markers;
- When administering drugs to foals with intravenous catheters and nasogastric feeding tubes, differentiate the two ports, either with labels or different tube connections;
- Ensure anyone tasked with administering medications has written instructions (and in the case of caretakers who might speak a different language, Adam said, ensure they have access to instructions written in their native tongue); and
- Because fatigue has been shown to play a role in making mistakes—and many equine veterinarians find themselves overworked on a regular basis—Adam said to double-check your work (be it if you're administering drugs or leaving an owner with medication administration instructions), as well as your team's, for accuracy.

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Ashley E. Craig, DVM
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"In emergencies, in the words of Churchill - keep calm and carry on" #AAEP2012 Great line!

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