

# Thermal Imaging, Injury, and the WORKING DOG

Kimberly Henneman, DVM, FAAVA, CVA, CVC

**For over twenty years** as a sports medicine veterinarian, not a day has gone by where I haven't sometimes wished a patient could talk to me and tell me where they hurt or what they were feeling. However, being a realist and knowing that I am never going to get that info verbally from my patients, I have looked long and hard for the tools to get my patients to speak to me in other ways. Then...ten years ago, an equine surgeon friend showed me a tool just coming onto the medical market...a tool modified from military and house inspection uses. That tool was thermal imaging, or the ability to read reflected heat from a body.

Thermal imaging, the same type of colorful, tracking imagery seen in the Arnold Schwarzenegger film "Predator", has been around for decades, but didn't start becoming practical and affordable as a medical tool until the advent of digital technology. My old analog thermal camera had three fairly heavy and cumbersome components. The camera was separate and attached by cable and had to be filled with liquid nitrogen, and images had to be taken off of a TV monitor screen with a separate camera. Today's cameras (**Photo 1**) are about the size of a large flashlight or SLR camera, run off of a battery and store hundreds of detailed digital images. Additionally, with the correct software, temperature ranges can be changed to increase detail and definition. I guess a bit of an added benefit is that I can also find studs in the walls and water leaks.

So what does this mean to the performance dog owner? For me, it means that I now have a practical, small, efficient tool that fits in a suitcase and can recharge off of my car battery to monitor soft tissue stress, function and injury. Typically in veterinary medicine, our imaging diagnostic tools only evaluate structure (x-rays and ultrasound) and then mostly only that of bone with x-rays. Unfortunately, no one has really come into the canine sports medicine world yet using the ultrasound to evaluate muscles, tendons and ligaments as they have in the equine world (yet injuries in these structures are just as important to the working dog). Thermal research in the equine world has shown thermal imaging to be very effective in not only identifying injuries before they get to a crisis stage, but also injuries not obvious to the examiner (due to masking by another injury). Not to much has been done yet with thermal imaging in the performance dog, but the field is a blank slate with unlimited potential and possibilities. The insulating ability of hair can sometimes be more of a problem, but you can still get information from the legs, face and ears.

Thermal imaging can give performance and working dog veterinarians who want to do more than just throw an anti-inflammatory at a lame dog a great, new tool for not only diagnosing an existing soft tissue injury, but actually catching it in the early stages. My husband used to fly smokejumpers for a living, and the smokejumpers have a saying, "every fire starts small." That means it is easier to deal with a problem in the initial stages. That can be a bit difficult with the high drive dog because many won't tell us that they have an issue cooking until they are already three-legged or can't move their necks or backs.

But thermal imaging either as a regular part of maintenance or even when they are 'ADR' (ain't doin' right) can give significant clues. The abnormal temperature hints of cool or warm may not tell me exactly what the problem is, but it can certainly tell me where to start looking. This will not only save me time and the owner money (by not having to x-ray everything) but it can also point out compensation stress points that can be addressed with massage, chiropractic, acupuncture or physical therapy.

Dealing with the whole dog not only can make sure that you are really getting to the injury efficiently, but can it can also ensure that any compensations that could affect performance later are addressed before they have a chance to cause problems. In the hands of someone who really understands movement mechanics and structure relationships, thermal imaging monitoring after an injury can also help tailor training regimes to make sure that tissues aren't being stressed too early and that conditioning is moving at a pace that is appropriate for that particular animal's recovery. (Having recently had to have an ACL repaired, I am currently using thermal imaging to monitor the recovery of my injured leg and make sure I don't overstress the good one as well).

The uses for thermal imaging are limitless. Another use we have found is checking to make sure harnesses are fitting. Recently at an avalanche dog training school, we monitored several dogs before and after a day of helicopter lifts and back-country rescue training. We found several dogs with harness rubs; only one harness (a new design) didn't impinge or rub on the dog for the entire day. Although those dogs didn't show overt problems with their activities associated with searching and digging out a victim, on palpation, several dogs tensed and showed discomfort in those areas. No doubt, eventually those repetitive stress areas, left unaddressed, could one day lead to problems – and maybe not obvious ones, such as problems in an opposite compensation leg, in the neck or referred pain to the back. Additionally, we have come across some interesting findings, plain and simply because we were willing to be open-minded and look for a cause when we have had an 'odd' thermal scan. As my equine thermal colleague likes to say, "it shows us what we didn't know we didn't know."

So what does thermal imaging in the working dog look like? Our practice includes not only sled dogs, but also dogs who do agility, fly-ball, obedience, herding, police/patrol, explosives/drug detection, wild-land search-and-rescue and avalanche rescue, so we see all kinds of issues. These photos are a mix of dogs from various disciplines. Here is how to interpret the images. On the right is a scale that is the temperature range that I am using for that scan. Above the upper temp and the image will be white; below the lower temp and the image will be black. I can adjust this during a scan to give me the best possible detail in the color range that I like to see (everyone is a bit different on their color differences). The crosshair in the middle is the temperature shown in the upper right. On the camera itself or within the software, I can move both the crosshair to measure specific areas as well as the range.

