



Thermal imaging helps Olympic riders and their horses win medals

FLIR cameras help spot clinical problems in horses early on, preventing serious injury

In equestrian sports like horse racing, show-jumping, dressage and polo, the horse is at least as much the athlete as the rider. Perhaps even more so, for the horse is the one that mostly takes care of the physical exertion. Just like any other athlete, horses can get injured, but FLIR thermal cameras help to keep the horses healthy and ready to perform at the peak of their ability.

"Thermal imaging is a wonderful tool to spot an injury before there are any visible signs", says Sandie Chambers, director of training and development for Equitherm, a company that specializes in equine thermal imaging. "In fact, with thermal imaging you can sometimes see injuries two or three weeks before any physical signs and symptoms are visibly apparent."

'Discovering thermal imaging was like finding gold'

Sandie has studied both human and equine sports science and has been the driving force behind Equitherm. Having spent almost her entire career in Equine sports and being a seasoned Equestrian herself, she immediately realized the importance of thermal imaging for the equine sports industry. "When I discovered how effective thermal imaging was



By detecting minute differences in the horse's thermal and neural condition, the FLIR B335 allows you to quickly and efficiently identify trauma in an injured animal

in identifying trauma and stress in the horse, it was like finding gold."

Equine thermal imaging is a non-invasive diagnostic tool that uses thermal imaging equipment and computer software to detect minute differences in the horse's thermal and



Sandie Chambers shows the FLIR B335 thermal camera to her horse Zidane.

neural condition. "It allows us to quickly and efficiently identify trauma in an injured animal. By identifying the location of the injury we can prevent further damage." Sandie and her colleagues at Equitherm use the FLIR B335 series thermal cameras to scan the entire horse's body for hot or cold spots. A hot spot indicates inflammation or increased blood flow. Cold spots indicate a decreased blood flow, usually the result of swelling, nerve damage or scar tissue.

Lightweight and easy to use

Sandie is very happy with the FLIR B335 thermal camera. "It provides the kind of detailed images you need to diagnose sport related injuries. We advise anyone who wants to use a camera in this way to go for a resolution of 320x240 or better. With a lower resolution you really can't draw any



APPLICATION STORY



You can twist and turn the B335 series to take pictures from difficult angles

conclusions as to a horse's health whatsoever. What makes the B335 series ideal for this kind of use isn't just the resolution. You can twist and turn the camera relative to the viewfinder and that's very useful for taking pictures of the horses back. But the main advantage the FLIR B335 has is the fact that it's compact and light, which is very important when you're working with horses. They are animals after all and as such they can sometimes be a little bit unpredictable. Performance horses are even more unpredictable than the average horse, for to be able to perform at a high level the horse has to have a strong willful character and a fiery nature, otherwise



When operating this close to a horse, it is important that you can get away quickly. The compact and lightweight FLIR B335 series allows you to do that.

these horses couldn't achieve those remarkable results. But that means that the horse can suddenly make a move towards you and if that happens, you don't want a big and cumbersome camera slowing you down. With the FLIR B335 series I don't have to worry about that, I know I can get away because of the camera's small size and light weight."

She's also very pleased with the camera's software. "With FLIR's Reporter software it is really easy to export the images to a computer for further analysis. And that is very important, because for this application you need to use the computer to filter out all irrelevant information to be able to see the thermal patterns in detail."

'Riders can feel it when there's something wrong'

An important Equitherm client is Rhett Bird an International Grand Prix Dressage rider and trainer. He employs Equitherm to conduct regular checkups on his horses and is very pleased with the possibilities thermal imaging provides. "We ride the horses every day and sometimes we'll feel small changes in the way a horse moves but sometimes when we take a horse to the vets they are unable to detect anything, because they can't perceive any symptoms. And of course the horses can't explain that they're hurt and where it hurts, so thermal imaging helps us by giving another insight into what's going on inside the horse's body. For instance: we've had several horses that started to under-perform. They didn't show any lameness, but we could sense there was something wrong. Thermal imaging identified irregular thermal pattern in the muscles, possibly indicating muscle injury. We could therefore adapt our training to spare the muscles in question without it turning into a real injury."

But thermal imaging isn't just a tool for prevention; it's very useful to monitor a horse's recovery as well, explains Rhett. "When a horse has been injured it's difficult to know how far you can push them without damaging them. So when a few of our horses were injured we had them checked all over using thermal imaging before we allowed them to start training again, just to make sure that the symptoms were completely gone. We wanted to make sure that we could build up the work load safely. It is good to have the reassurance



that you're not pushing the horse too much too quickly and that the problem isn't re-occurring even in the slightest bit. Thermal imaging does just that; it takes the guesswork out of it."



Sandie shows Rhett the thermal images of one of his horses

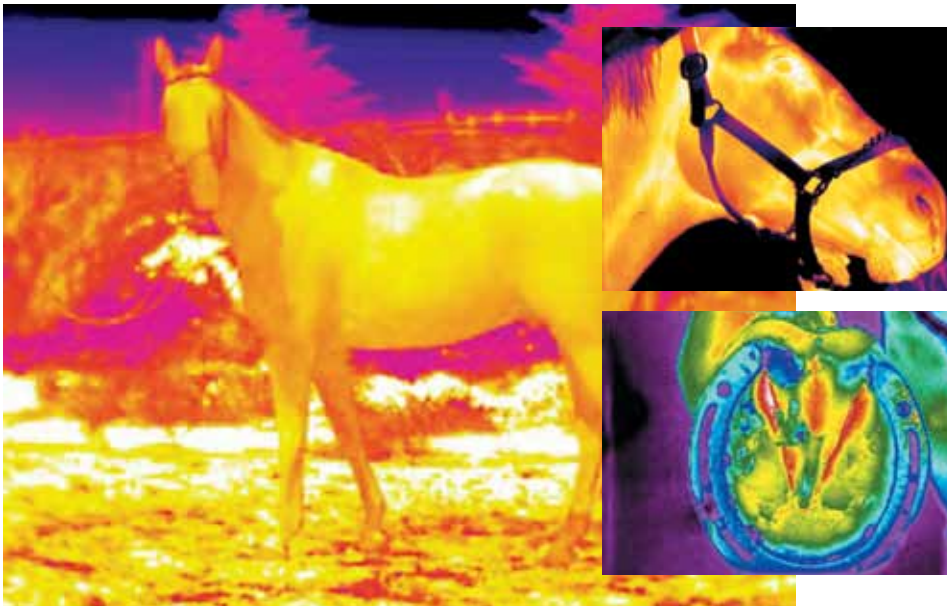
Thermal imaging goes Olympic

It's not just Rhett that employs Sandie's services. During the Beijing Olympics 2008 she was consulted by several of the Olympic teams to provide monitoring support. "That was a very exciting opportunity to showcase the possibilities of thermal imaging in the equine sports. Using the FLIR thermal camera we monitored the horses to make sure that the horses were in good physical condition and ready to perform at the peak of their ability. The teams were very impressed by the quality of the images the FLIR cameras produced and I'm really looking forward to be of assistance at the 2012 Olympics."

But it isn't just the candidates that are in the running for an Olympic medal that can benefit from the use of thermal imaging, according to Sandie. "All horses stand to gain from it, both the professional performance horses and the horses that are being kept for recreational purposes alike." Rhett agrees. "It makes sense that it is used more often on performance horses, for they are generally more expensive and they do run more risk of straining or injuring themselves due to the intensive way they use their body, but unfortunately all horses injure themselves. Whether the horse is in the field or in the stable, they do seem to get in all sorts of trouble."



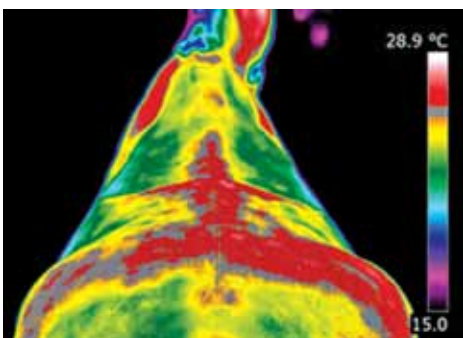
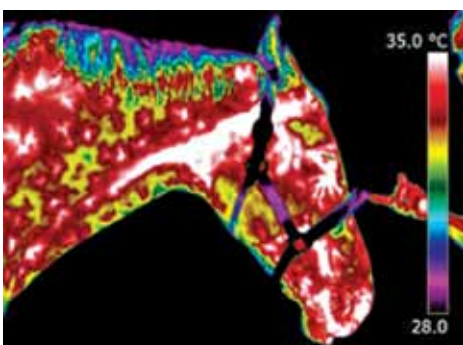
During the 2008 Olympics in Beijing Sandie made sure that the participating horses didn't injure themselves.



'Moral obligation'

One of the reasons for horses being prone to injury is that horses aren't built for the activities we humans have them perform, adds Sandie. "Horses are typical flight creatures and that means that they evolved to run away quickly when they're in danger, not to jump or prance about with a human on their back. Because their bodies aren't made for this, they are very prone to injury. That gives us humans the moral obligation to look after them properly. Thermal imaging allows us to do that."

"As flight animals they also hide their weaknesses", continues Sandie. "If you would show weakness in the wild, predators would pick you as a target."



Sandie: "With equine thermal imaging you look at the symmetry in the horse's thermal pattern"

Horses are therefore very good at hiding a limp for instance. And it is quite obvious that they can't tell us what's wrong. But thermal imaging allows the horse's body to speak for itself as it were."

Prevention: better than a cure

Equestrian thermal imaging can be a real life saver, according to Sandie. "During a routine checkup we found that there was something wrong with a show-jumping horse that was scheduled to take part in a competition two days later. The horse wasn't showing any visible signs of an injury, it wasn't limping for instance, but the thermal image quite clearly showed that there was something wrong with the left front leg. We immediately called in the vet who performed an ultra-sound scan which confirmed my initial observation that there was something seriously wrong: the horse had a partially ruptured tendon right at the spot where we had found the thermal anomaly."

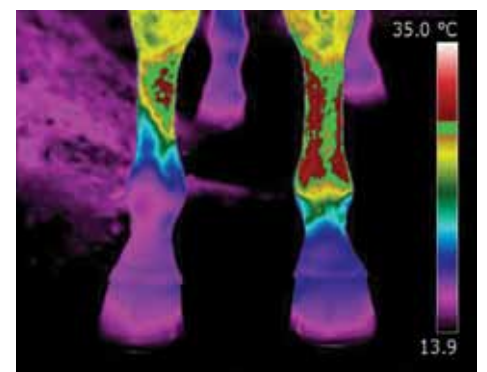
If this injury would have remained undiscovered, Sandie believes the consequences would have been catastrophic. "Had we not picked up the anomaly in the horse's thermal pattern then the tendon might have ruptured completely, causing the animal a lot of pain and distress and that would be the end of the animal's career as a show jumping horse. For the owner this would mean expensive bills for both veterinary care and the subsequent rehabilitation. It would probably also cause a big reduction in the horse's value and consequently a loss of investment."

"It's common knowledge that for some of these performance horses, especially the ones that have, together with their riders of course, won prestigious awards, the price tag can be as high as several hundreds of thousands pounds. This case shows that thermal imaging is a very helpful tool to protect that kind of investment."

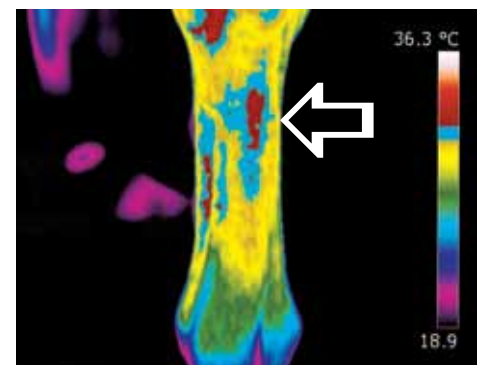
Sandie now uses the thermal imaging camera to monitor the horse's recuperation process. "We will be able to see quite clearly when it will be ready to take part in competition again."

Symmetry in the thermographic pattern

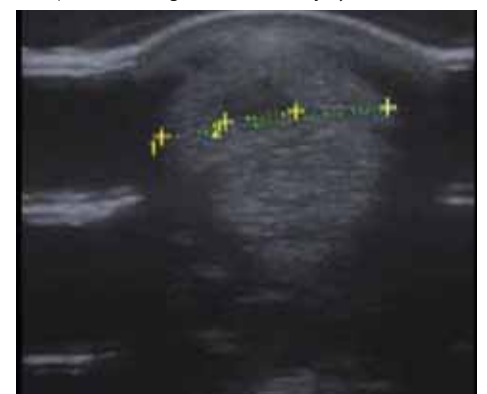
Using thermal imaging in this way is however quite different from other thermographic applications. "You don't look at the exact temperature when you're analyzing the thermal images of a horse, not as much as when you're analyzing a building or electrical circuit. What you're actually looking at is the symmetry of the horse's thermographic pattern. When I'm looking at thermal data I'm constantly comparing left



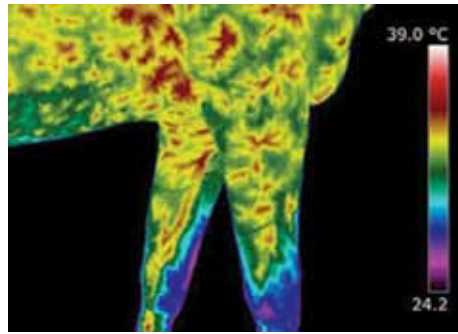
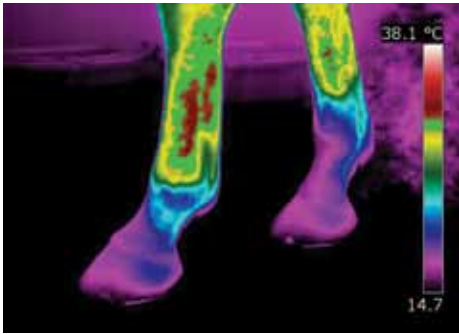
In a routine thermography checkup Sandie discovered a severe injury. There is an obvious difference in the thermal pattern between the left and right front leg



This is the injured leg in close-up. There is a very clear hot spot indicating some kind of injury in the tendon.



The follow up diagnostics by a vet included an ultrasound scan in the location of the hot spot. The resulting ultrasound scan quite clearly shows that the tendon has been ruptured.



unlike other diagnostic tools, thermal imaging does not involve touching the animal either physically or with some kind of radiation. It is a practical and easy to use method to diagnose injuries.

to right, for if there is an injury you'll see an asymmetric anomaly in the pattern. It's only after I've found an occurrence like that when I start to look at the exact temperatures, for that might be a crucial piece of information for the vet that follows up on my initial investigation."

In Sandie's opinion thermal imaging is a unique tool for veterinary inspection. "Not only is it non-invasive; this means that we can investigate the horse without touching it, it is also the most practical way to spot problems in the horse's lower limb tendons, ligaments and joints as well as soft tissue areas of the upper limbs and heavily muscled areas of the upper body. With more conventional diagnostic tools like X-ray, CT scan or ultra sound it's also very difficult to get to

the stifles, the leg-joints that correspond to the human knee; but these joints can be monitored very well with a thermal imaging camera. Other areas where a thermal imaging camera can be very useful are the feet, backs and teeth."

'Not just point and click'

Another consequence of the fact that thermal imaging is a non-invasive method, is that you can use it without a veterinary license. But the fact that it requires no license does not mean that you can just buy a camera and start inspecting horses, explains Sandie. "Due to the ease with which modern thermal cameras can be used, a lot of people make the mistake to think that using a thermal camera for veterinary purposes is just a matter of point and click.

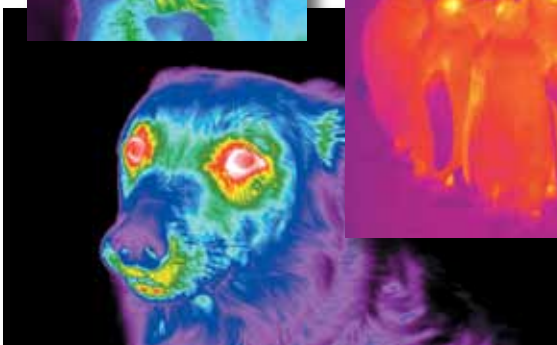
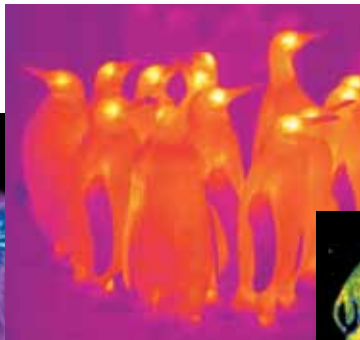
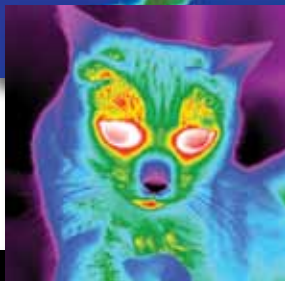
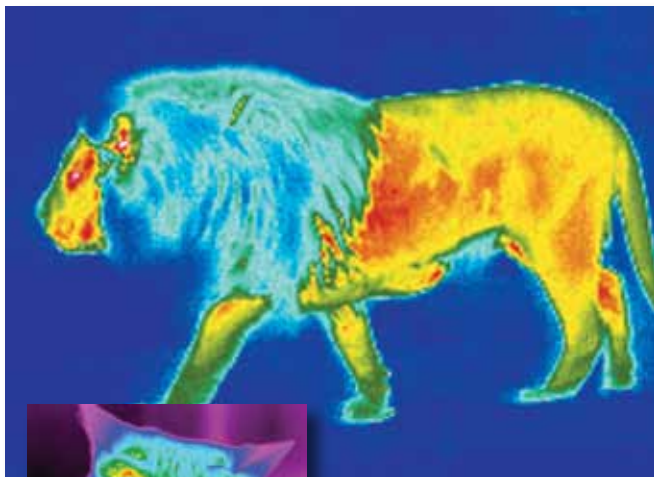
Don't get me wrong, the FLIR cameras we use are very easy to operate, but to be able to draw any conclusions from the thermal data you really have to know what you're doing. You have to understand, for instance, what circumstances influence the thermal camera's readings, like raindrops, bits of mud, but also sunshine or a breeze coming in from an opened window. All of these external influences we call artifacts. You have to get rid of artifacts as much as possible to get an accurate reading. But even if you grasp the thermal imaging part completely, there's still more you need to know. It goes without saying that you have to understand the rudimentary basics of animal anatomy and pathology, but every horse breed even has its own typical thermal patterns that you have to take into account when analyzing the thermographic data. And every equine sport strains the horse's body in different locations, so you have to know which body parts to give extra attention to."

Sandie's company Equitherm provides training to aspiring veterinary thermographers. "All kinds of people have enrolled in our courses. Not only equine practitioners like trainers, breeders, farriers, physiotherapists, saddle fitters and the like, but also animal handlers in zoos as well. We've even been asked to demonstrate the FLIR thermal cameras we use, and what we can do with them, to the handlers of Longleat, the safari park in Wiltshire that's the subject of a BBC real life series about the daily life in the park."

'We've only scratched the surface'

Sandie also thinks that another promising market for thermal imaging is the farming industry. "Several commercial agricultural enterprises have consulted us. We investigated, for example, a farm where young sheep were dying of an unknown cause. With the help of thermal imaging we were able to prove that their coats didn't insulate as well as they should yet, causing them to die of hypothermia. In another instance we were called in to check meat cows due for the slaughterhouse on signs of infection like the rise of their body heat. I'm convinced that we've only just scratched the surface of what we can do with veterinary thermal imaging."

Veterinary thermography is far from restricted to horses; it works with all living creatures. Whether it is a horse, cat, penguin, dog or even a human, thermography provides new ways of recognizing injuries or illness before any physical signs and symptoms are visibly apparent



For more information about thermal imaging cameras or about this application, please contact:

FLIR Commercial Systems B.V.
 Charles Petitweg 21
 4847 NW Breda - Netherlands
 Phone : +31 (0) 765 79 41 94
 Fax : +31 (0) 765 79 41 99
 e-mail : flir@flir.com
 www.flir.com