

Blowing in the wind: How accurate is thermography of horses' legs?

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Infrared thermography is increasingly being applied to investigate the cause of lameness in horses. The equipment is easy to handle and the method is fast and safe, both for the animal and for the vet. But is it accurate? Recent work by Simone Westermann at the Vetmeduni Vienna shows that the technique is surprisingly tolerant of variation in the position of the equipment, i.e. how far from the horse and at what angle to the animal the infrared camera is held. However, it is extremely important to ensure that the horse is not standing in a draught as even barely detectable wind speeds are sufficient to effect the measurements dramatically. The findings are published in two articles, one in the *Journal of the American Veterinary Medical Association* and the other in the *Equine Veterinary Journal*, and are sure to be of great interest to vets throughout the world.

Since its introduction fifty or so years ago, thermography has been increasingly used by vets to pinpoint the cause of lameness in horses. The method is fast and safe and is based on a simple idea. The horse's [body surface](#) emits [infrared radiation](#) that can be detected by an [infrared camera](#), which is both easy and inexpensive to use. The camera produces a coloured image that shows the variation in surface temperature across the area investigated. The temperature is directly related to the presence of blood vessels near the skin, so the method can detect local inflammatory lesions or regions of modified [blood flow](#) and thus help localize the origin of lameness.

The theory is clear but to date there have been comparatively few

investigations into the reliability of the method. Furthermore, it is important to note that in practice trivial matters such as [time constraints](#) and movement of the horse can cause changes in both camera angle and distance of the camera to the area of the horse being investigated. The effect to which these changes affect the results of thermographic imaging is unknown. Finally, although it is generally accepted that thermographic imaging of horses should be performed in draught-free surroundings, there have not been any published studies on the effect of airflow on the results.

These issues have now been tackled by Simone Westermann of the Clinical Unit of Equine Surgery at the University of Veterinary Medicine, Vienna, together with colleagues at the University of Veterinary Medicine, Vienna (Vetmeduni Vienna) and with Adrian Ion at the Vienna University of Technology. The scientists found that the method was highly reproducible and was less sensitive to variations in camera position and angle than might be expected. In fact, the results were almost completely unaffected by 20° changes in camera angle and increases of up to 50 cm in the distance of the camera from the animal. At a distance of 1 m from the horse a 20° change in camera angle corresponds to about 35 cm. This represents the effective horizontal tolerance in positioning of the camera. As Westermann says, "vets should have little difficulty in remaining within this limit, so the method is applicable in practice". Surprisingly, the results showed that horses' left and right forelimbs show minor differences in temperature and Westermann cautions that "it might be important to take these into account before reaching a final diagnosis."

The technique is thus reliable and robust, at least in terms of variation in where the camera is located. However, it turned out to be extremely sensitive to even very gentle drafts. A wind speed of less than 1 m/s causes a drop in measured temperature of about 0.6°C, while winds of 1.3-2.6 m/s cause a drop of 1.5°C and winds of 3-4 m/s cause a drop of

2.1°C. The discrepancies are more than sufficient to lead to a wrong diagnosis, although even the highest wind speed tested is hardly perceptible: it would barely cause leaves on trees to move.

Westermann is keen to note the relevance of her work for vets who work on horses. As she says, "It turns out that it is not too important to be sure that the camera is in exactly the correct position before taking measurements. But it is essential to perform thermography on horses in a room that is completely free of draughts. If you don't, your diagnosis will be completely unreliable."

More information: Westermann, S. et al. The effect of airflow on thermographically determined temperature of the distal forelimb of the horse, *Equine Veterinary Journal*. [doi: 10.1111/evj.12019](https://doi.org/10.1111/evj.12019)

Westermann, S. et al. Effects of infrared camera angle and distance on measurement and reproducibility of thermographically determined temperatures of the distolateral aspects of the forelimbs in horses, *Journal of the American Veterinary Medical Association* (Vol. 242, pp. 388-395). [dx.doi.org/10.2460/javma.242.3.388](https://doi.org/10.2460/javma.242.3.388)

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