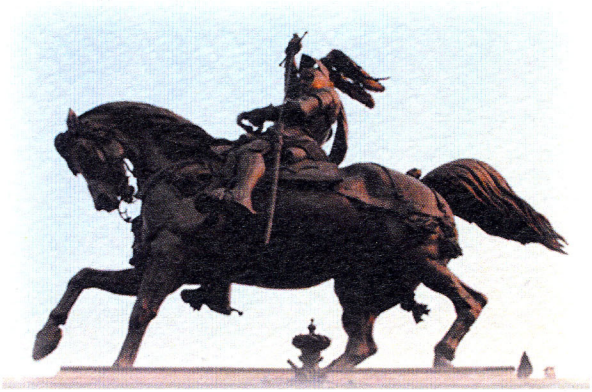
UNIVERSITÀ DEGLI STUDI DI TORINO

Atti del 12° Convegno
Nuove acquisizioni in materia di Ippologia

Proceedings of the 12th congress
New findings in equine practice

Centro Internazionale del Cavallo
La Venaria Reale



Centro Internazionale del Cavallo
Druento (TO), 11th-13th November 2010

Cascina Rubbianetta Parco Regionale La Mandria
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Thermography in racehorses running on a high speed treadmill

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Riassunto: *Questo lavoro è lo stato di fatto di uno studio iniziato lo scorso anno con lo scopo di standardizzare e ottimizzare l'utilizzo della tecnica termografica per la realizzazione di video durante il lavoro di cavalli sportivi su treadmill ad alta velocità. Fino ad ora sono stati realizzati 20 video termografici durante test da sforzo, utilizzando una termocamera modello AVIO TVS 500, dotata di sensore microbolometrico con 320x240 pixel operante nella lunghezza d'onda tra 8 µm e 14 µm, con risoluzione termica migliore di 0,1°C. La registrazione termografica è stata effettuata sia durante l'intero svolgimento del test, sia per alcuni minuti sia prima che dopo il test stesso. Gli andamenti ottenuti per la temperatura superficiale sono caratterizzati da una successione di livelli, ognuno dei quali caratteristico delle diverse andature raggiunte; in particolare, le temperature massime sono state raggiunte durante la fase di recupero dopo lo sforzo. La fase successiva sarà definire i limiti di normalità per soggetti sani e ben allenati, in modo da poter utilizzare la tecnica per ottimizzare l'allenamento e le performance dei cavalli sportivi.*

Summary: We are going on with a work started last year, whose aim is to optimize and standardize the use of thermographic technique in recording videos of sport horses tested on a treadmill and investigate their significance. At now we have been successful in creating twelve digital thermographic videos of horses on treadmill during effort tests, using a thermocamera model AVIO TVS 500, with a VOX microbolometric sensor of 320x240 pixel, operated in the radiation wavelength between 8 µm and 14 µm, with thermal resolution better than 0.1 °C. Videos were taken for the entire duration of the test when the horse were working on the treadmill, and some minutes before and after the test, in order to record the resting condition.
Thermal trends obtained are characterized by subsequent steps each of them reflecting a different speed. When walking or trotting, all horses presented similar thermal patterns, higher temperatures were recorded at gallop and maximal temperatures were found during the final recovery phase at walk. Next step will be assess borders for normal subjects, sound and well trained in order to optimize training and performance of sport horses.

Introduction

Mechanisms of performance reduction and chronic maladaptation in sport horses are still poorly understood; the term 'poor performance syndrome' is used to describe a combination of symptoms that do not have a single specific aetiology and therefore it is a condition with a difficult clinical management.
In order to define a diagnosis of subjects in which the detection of reactivity and performances is desirable, it is very important that animals are not disturbed by invasive instruments, to avoid changes in their behavioural and physiological responses. Thermographic technique, as a non invasive method, meets these requirements. Also, they allow a better understanding of changes in muscle blood flow and thermoregulation, as well as an early identification of inflammation related to musculoskeletal disorders

Material and Methods

We are going on in this study started last year used two thermocamera AVIO TVS 500, which is a rugged and portable instrument with a VOX microbolometric sensor of 320x240 pixel, operated in the radiation wavelength between 8 µm and 14 µm, with thermal resolution better than 0.1 °C and acquisition frequency of 60 Hz. Videos were taken for the entire duration of the test when the horse were working on the treadmill, and some minutes before and after the test, in order to record the resting condition. Tests have been carried out at the Clinical Hospital of the Milan Veterinary Faculty, in a controlled treadmill room where environmental temperature, humidity and ventilation were kept under constant conditions. Horses were standardbred trotters in training, both male and female.

Results

At now we have been successful in creating twelve digital thermographic videos of horses during effort and it was possible to evaluate the heating process of the horses' different skin regions, according to the different gaits. Thermal differences between average max temperatures during each phase and the walk phase were calculated. Thermal trends obtained are characterized by subsequent steps each of them reflecting a different speed. When walking or trotting, all horses presented similar thermal patterns, higher temperatures were recorded at gallop and maximal temperatures were found during the final recovery phase at walk

Conclusion

In the present paper, we have used the digital thermographic video to evaluate the heating evolution during the activity on the treadmill in order to study the thermoregulation process of sport horses. Next step will be to use contemporarily other physiological correlates (such as heart rate variability, or blood parameters) and to assess limits for normal subjects, sound and well trained in order to optimize training and performance of sport horses.