

## Thermography as an aid in the localization of upper hindlimb lameness

T. A. Turner

College of Veterinary Medicine, University of Minnesota, U.S.A.

### Summary

Thermographic images were very useful in localizing the area of injury in upper hindlimb lameness of horses. The most frequent problems that were noted were muscle strains or muscle inflammation. Three distinct regions were commonly seen: cranial thigh, caudal thigh, and the croup region. In the cranial thigh, distinct hot spots were associated with the quadriceps musculature just proximal to the insertion on the patella. In the caudal thigh the most common area of inflammation was at the musculotendinous junction of the semitendinosus muscle. Another area of abnormal thermal patterns commonly seen in the caudal thigh was just caudal to the third trochanter of the femur directly over the biceps femoris. The croup area injuries involved hot spots over the loin region, over the sacroiliac region, over the body of the gluteal muscle, and over the third trochanter.

**Keywords:** horse, muscle injury, myopathy, thermography, diagnostic techniques

### Thermographie als Hilfe bei der Lokalisation von Lahmheiten im oberen Bereich der Hinterhand

Die thermographische Darstellung war sehr hilfreich bei der Lokalisation des Schädensbereiches bei Lahmheiten in der oberen Hinterhand von Pferden. Die am häufigsten auftretenden Probleme waren Muskelzerrungen oder Muskelentzündung. Drei verschiedene Regionen wurden in der Regel untersucht: der kraniale und kaudale Oberschenkelbereich und die Kruppenregion. Im Bereich des kranialen Oberschenkels waren verschiedene warme Stellen assoziiert mit der Quadriceps-Muskulatur direkt proximal ihres Ansatzes an der Kniekehle. Im Bereich des kaudalen Oberschenkels traten Entzündungen am häufigsten am Musculus semitendinosus auf, und zwar an der Übergangsstelle in seine Sehne. Ein anderer Bereich mit abnormalem Temperaturmuster, der am kaudalen Oberschenkel häufig zu finden war, lag caudal des Trochanter tertius des Femurs direkt oberhalb des Musculus biceps femoris. Verletzungen im Kruppenbereich führten zu warmen Stellen oberhalb der Lenden- und Kreuzdarmbeinregion, der Glutäenmuskulatur und des Trochanter tertius.

**Schlüsselwörter:** Pferd, Muskelverletzung, Myopathie, Thermographie, Diagnosetechniken

### Introduction

Thermography is the pictorial representation of the surface temperature of an object (Purohit and McCoy 1980, Turner et al. 1986). It is a non-invasive technique that measures emitted heat. A medical thermogram represents the surface temperatures of skin making thermography useful for the detection of inflammation. Although thermographic images measure only skin temperature, they also reflect alterations in circulation of deeper tissues. This ability to non-invasively assess inflammatory change, makes thermography an ideal imaging tool to aid in the diagnosis of certain lameness conditions in the horse.

Muscle injuries are uncommonly documented as a cause of lameness in the horse. Fiorotic myopathy, stringhalt, and ruptured peroneus tertius are among the only muscle injuries reported in the horse (Turner 1987). These lamenesses are usually characterized by the resultant gait abnormalities. Other muscle problems such as stress tetany, synchronous diaphragmatic flutter, exhaustion, post exercise fatigue, tying-up (exertional rhabdomyolysis), and azoturia are regarded as specific physiologic disturbances (Hodgson 1985, Jones 1989). Muscle injuries frequently cause lameness in human athletes and racing greyhounds. Similar injuries therefore would be expected in the horse.

Factors which predispose to muscle strains include cold temperatures or impaired circulation to the muscle, local or generalized muscle fatigue, poor or insufficient training, and insufficient warm-up (Krejci and Koch 1979). Cold has been shown to increase muscle tension and

cause circulatory disturbances. This phenomenon causes earlier muscle fatigue which can lead to uncoordinated muscle movement and strain. Fatigue predisposes to injury in two ways. First, muscle fatigue is a manifestation of general fatigue which affects those groups that are maximally loaded. As muscles fatigue they decrease in performance and elasticity thus enhancing the likelihood of strain. Further general fatigue results in central nervous system incoordination of movement and predisposition to strain. Therefore, training must be designed to progressively increase the work load to develop the muscle groups, and to decrease early fatigue and permit rapid restoration of muscle function after exertion. Insufficient warm-up of muscles prior to exercise results in decreased circulation and lowered capacity to eliminate muscle waste products. Both these factors decrease the muscle's ability to sustain maximal performance.

The equine athlete is exposed to these predisposing factors on a routine basis. Hypothetically, if the horse suffers muscle strains, these injuries would most likely be manifested as lameness. The difficulty for the veterinarian is the positive diagnosis of these injuries. In human medicine, the athlete's description of the pain location is often the single most important factor in diagnosis (Krejci and Koch 1979). This diagnostic aid is obviously lacking in veterinary medicine. Many of these cases probably go undiagnosed in equine medicine because they cannot be confirmed by commonly used diagnostic methods such as ra-