

**UTILIZING THERMOGRAPHY  
to ASSESS COMPLIANCE with  
THE HORSE PROTECTION ACT**

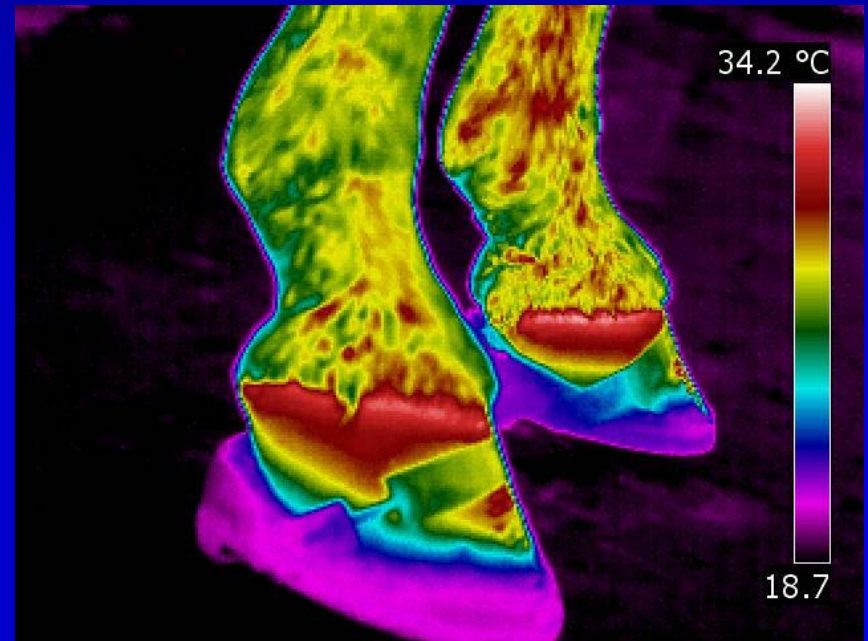
**TRACY A. TURNER, DVM, MS  
Diplomate, Am Col Vet Surgeons  
Diplomate, Am Board Thermology**

# **Tracy A. Turner, DVM, MS**

- **1978 Graduate Colorado State University**
- **M.S. degree Purdue University, thesis:  
“Thermographic Evaluation of the Equine Lower  
Limb” 1979-1981**
- **Spoke nationally and internationally on lameness  
topics**
- **Written over 100 manuscripts and book chapters**
- **Board certified in Surgery (ACVS) 1986**
- **Board certified in Thermology (ABT) 2002**

# THERMOGRAPHY and THE HORSE PROTECTION ACT

- 1975 NELSON, detection of SORING in Tenn Walking Horses
- 1978 report in JAVMA: THERMOGRAPHIC ENFORCEMENT of the HORSE PROTECTION ACT
- 1978-1982 PUROHIT, AUBURN UNIV: THERMOGRAPHY IN DIAGNOSIS OF INFLAMMATORY PROCESSES IN HORSES IN RESPONSE TO VARIOUS CHEMICAL AND PHYSICAL FACTORS



# WHAT IS THERMOGRAPHY??

**ANATOMIC  
IMAGING**

**RADIOLOGY**

**ULTRASONOGRAPHY**

**COMPUTED TOMOGRAPHY**

**MAGNETIC RESONANCE IMAGING**

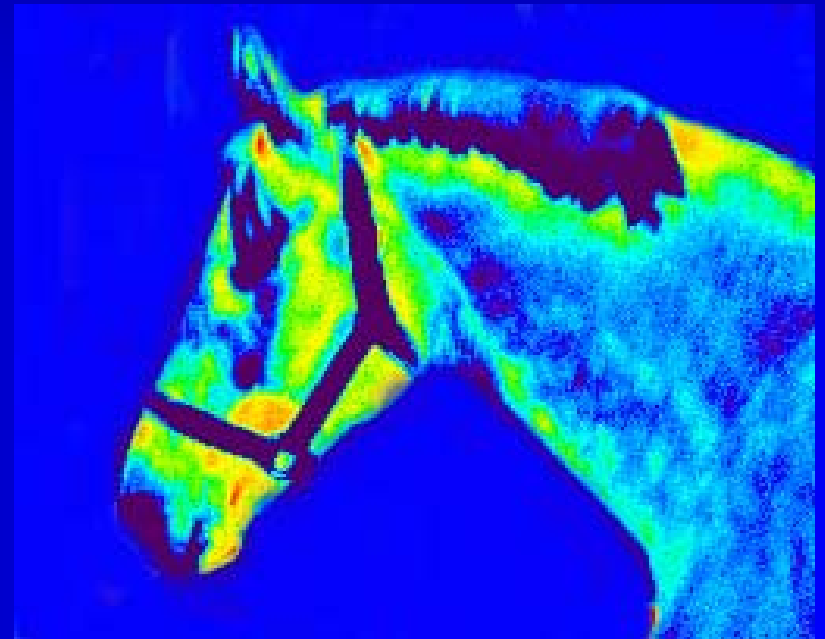
**PHYSIOLOGIC  
IMAGING**

**SCINTIGRAPHY**

**THERMOGRAPHY**

# THERMOGRAPHY THEORY

HEAT IS EMITTED IN THE FORM OF  
INFRARED RADIATION



# THERMOGRAPHY THEORY

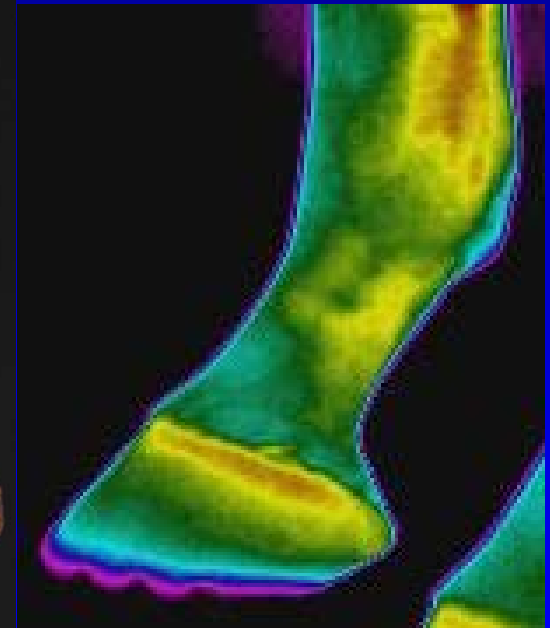
WHAT PHYSIOLOGY  
DOES  
THERMOGRAPHY  
MEASURE?

- LOCAL CIRCULATION
  - BLOOD FLOW
- LOCAL METABOLISM



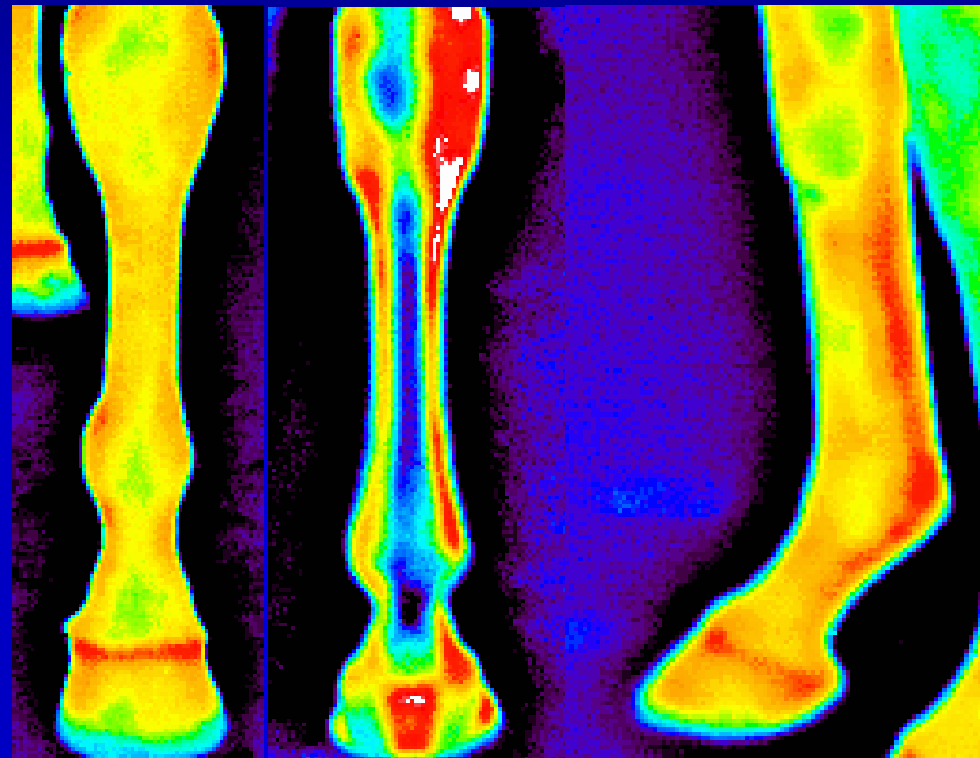
# THERMAL PATTERN

- DICTATED BY
  - ✓ CIRCULATORY PATTERN
  - ✓ LOCAL VASCULARITY
  - ✓ SURFACE CONTOUR



# THERMAL PATTERN

- **DORSAL VIEW = relatively cool**
- **TENDONS = relatively cool**
- **HEAT between MC/MTIII and FLEXOR TENDONS**



**Dorsal**

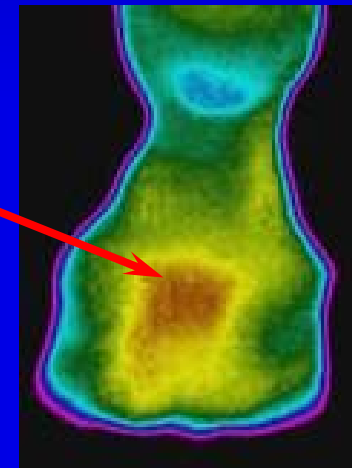
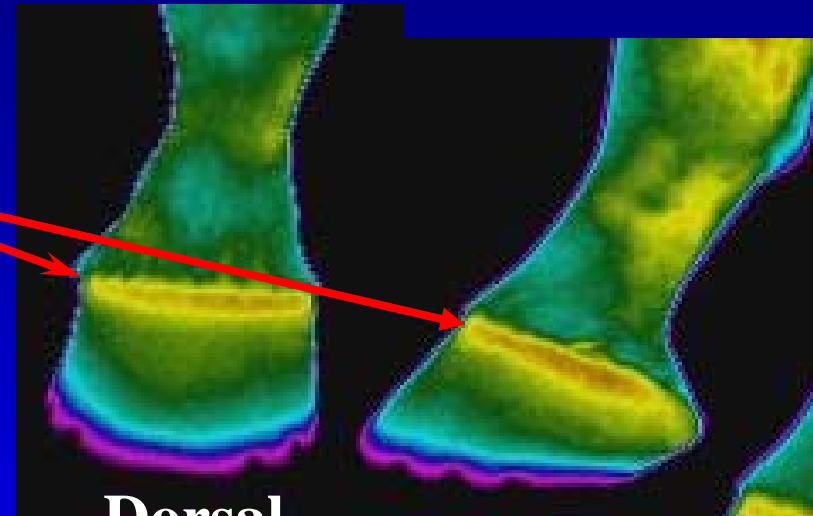
**Palmar**

**Medial**



# THERMAL PATTERN

- **CORONARY BAND and LAMINAR CORIUM are WARMER**
- **BETWEEN BULBS of the HEEL is WARMEST**



Palmar

# THERMOGRAPHY as a DIAGNOSTIC TOOL

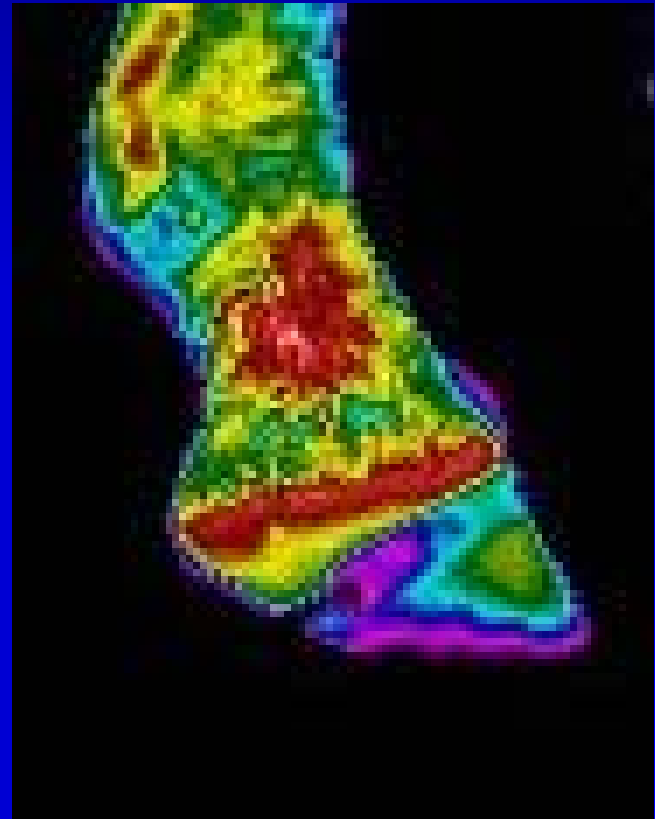
INFLAMMATION MAY BE  
DETECTED  
THERMOGRAPHICALLY  
AS EITHER:

- “HOT SPOT”
- “COLD SPOT”



# **THERMOGRAPHY can ENHANCE CLINICAL EXAMINATION**

- **QUALITATIVE ASSESSMENT  
OF THE VASCULATURE  
AND BLOOD FLOW TO  
TISSUES**
- **TELLS THE EXAMINER  
WHAT THEY DID NOT  
KNOW**
- **DETECTING HEAT WHERE  
IT WAS NOT PALPABLE**
- **DETECTS ABNORMAL**



# **THERMOGRAPHY and THE HORSE PROTECTION ACT A STUDY**

- **To develop an efficient protocol using thermal imaging and known standards of normality to identify horse's with abnormalities with the potential to either effect performance or be in violation of the standards of the Horse Protection Act.**
- **To develop an objective process to assign a index of suspicion to abnormalities identified.**
- **To provide materials to be used for education of Veterinarians, the general public, and members of the TWH community concerning proper preparation of horses for athletic competition.**

# STUDY DESIGN

## Research Activities

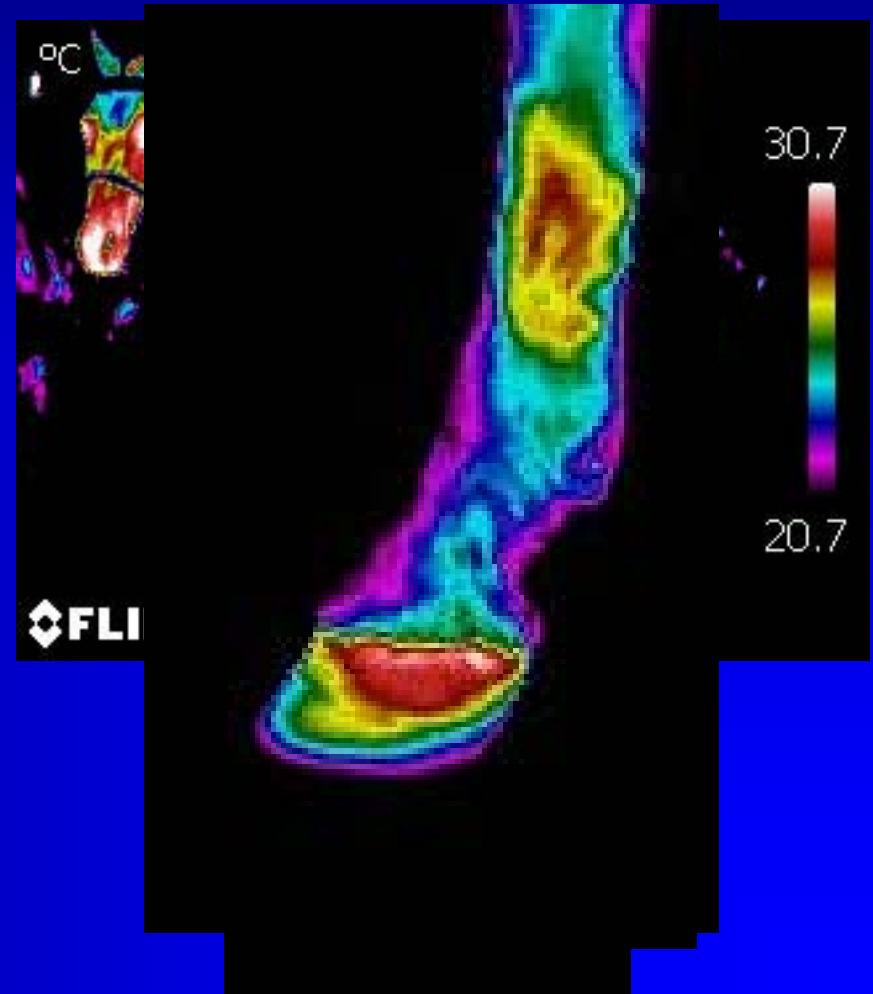
- 1) Pre-exercise Thermographic exam
- 2) Clinical exam using the currently established protocol which includes a 3 part evaluation of General Attitude (GA), Locomotion/Lameness (L), and Physical Exam / Palpation (PE). Each segment is scored 1 - 3 in terms of normal =1 and severe = 3.
- 3) Horse to enter the ring and compete vigorously in its normal occupation at winning level of intensity. Horse to stay in motion for 10 minutes.
- 4) Post Exercise Physical exam
- 5) Post Exercise Thermal Exam  
Horses allowed to cool out and rest.
- 6) Horses all received DP and Lateral Digital Radiographs of all four feet.
- 7) 2 hour post exercise Physical Exam.
- 8) 2 hour post exercise Thermal Exam.

Horse 1 excused from evaluation

- **Study Event took place in December 2007**
- **15 TWHs of various disciplines participated**
- **All horses were teamed by Persons Responsible to be fit to compete, and were currently being actively shown.**
- **Researchers were blinded as to the individual horse's identity or competition records.**

# RESULTS

- 15 HORSES EXAMINED,  
1 WAS NORMAL
- 5 HORSES HAD AN  
ABNORMAL PASTERNS
- 3 HORSES HAD  
ABNORMAL HOOVES
- 5 HORSES HAD  
ABNORMAL PASTERNS  
AND HOOVES
- 1 HORSE HAD  
ABNORMAL CANNON



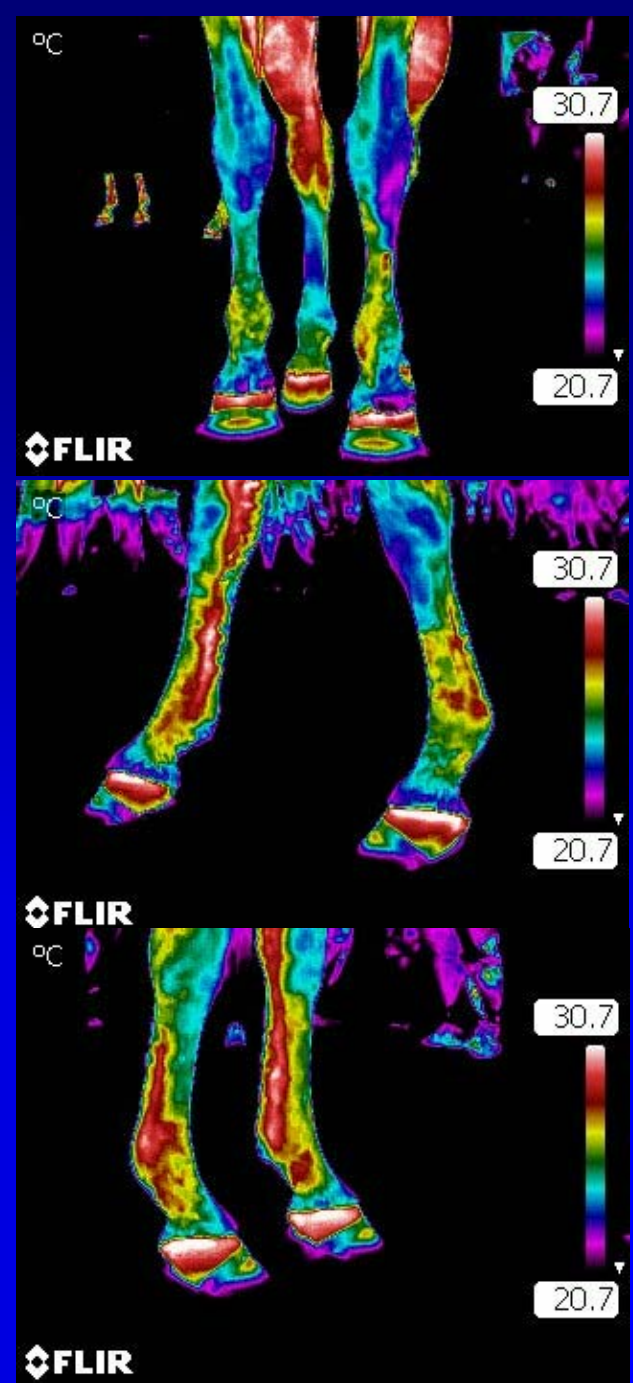
# RESULTS

- **14 ABNORMAL HORSES**
- **11 CONFIRMED ABNORMAL BY FURTHER EXAMINATION, PALPATION or DIGITAL RADIOGRAPHY**



# Horse 1

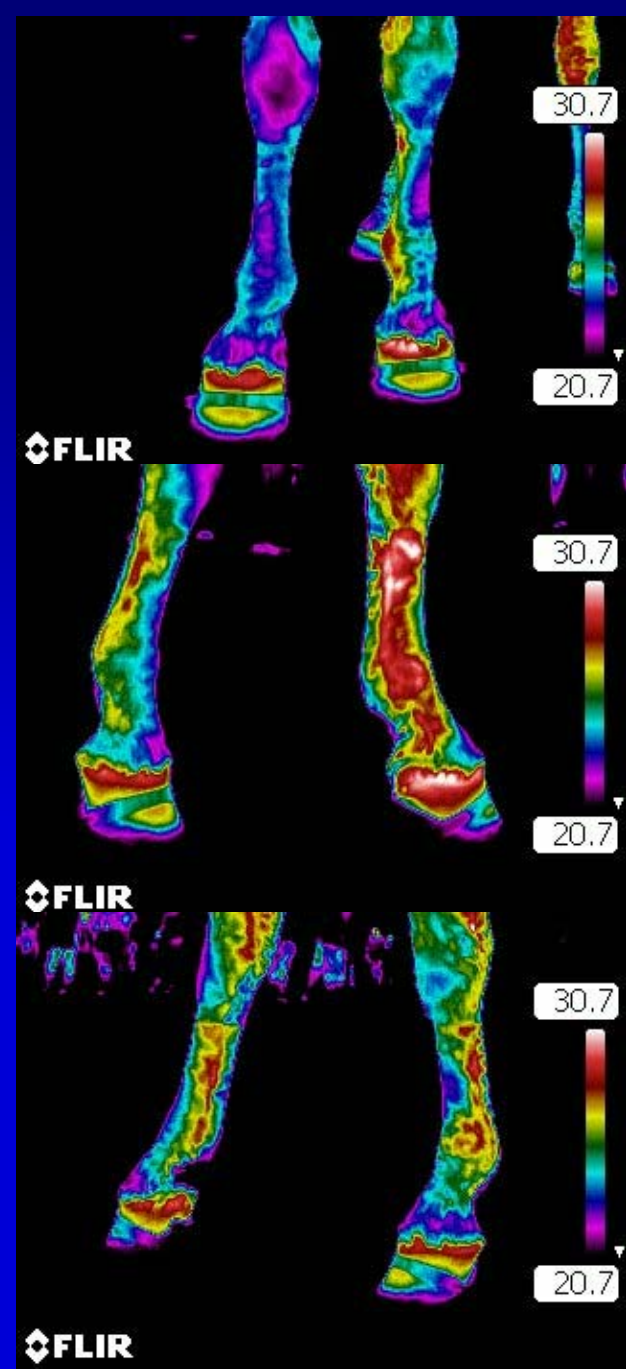
- Dorsal view asymmetry
- LF pastern cold
- RF medial heel cold
- LF medial pastern
- Inspection: general appearance normal locomotion normal, p.e.normal
- Rads WNL





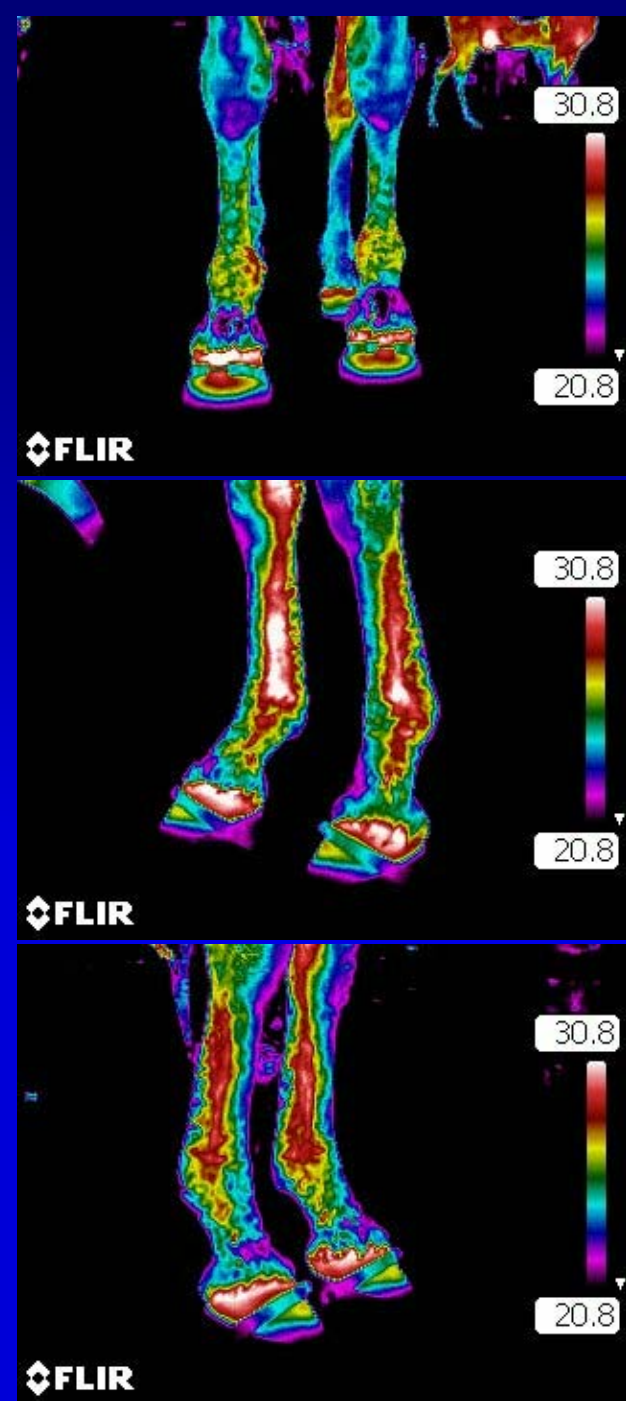
# Horse 2

- LF coronary band hot
- LF Pastern cold
- LF medial coronary band
- RF medial quarter
- Inspection: general appearance normal, locomotion normal, p.e. normal
- Rads: fx RF lat sidebone



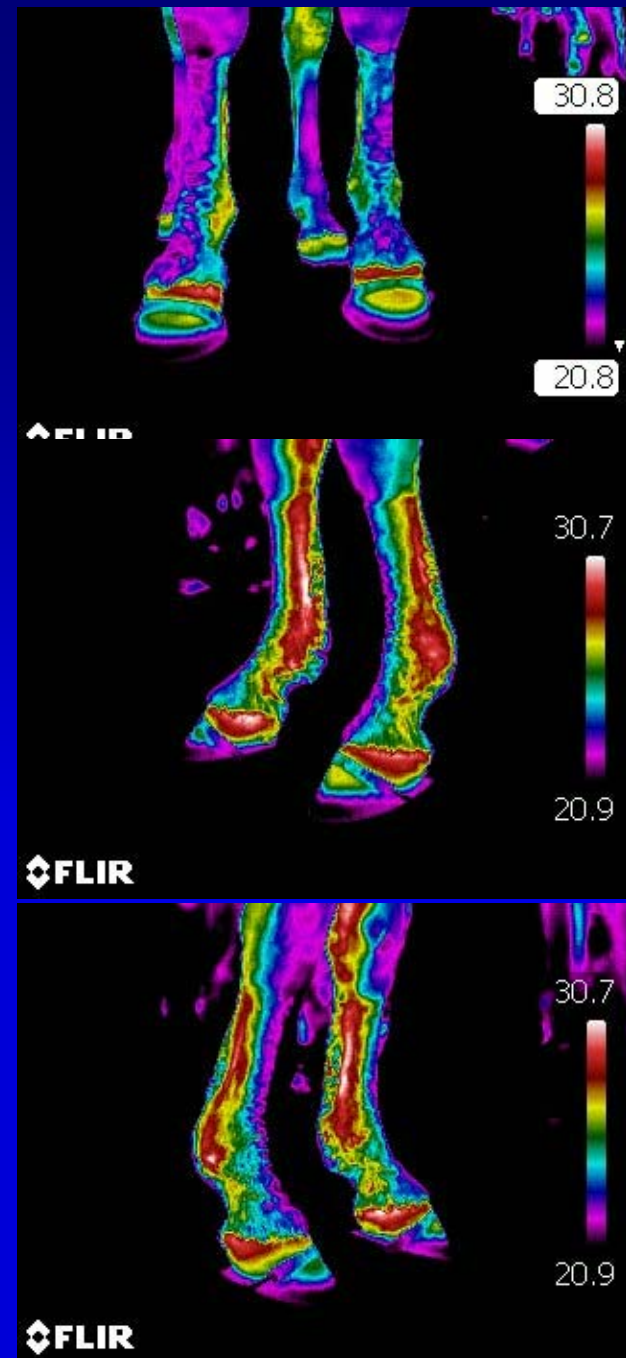
# Horse 3

- Asymmetric pasterns
- RF hot coronary band
- LF cold pastern
- Hot both feet medial and lateral coronary band at quarter
- Inspection: general normal, locomotion normal, p.e. LF inconsistent palp RF normal, smell of kerosene present
- Rads coronary band edema



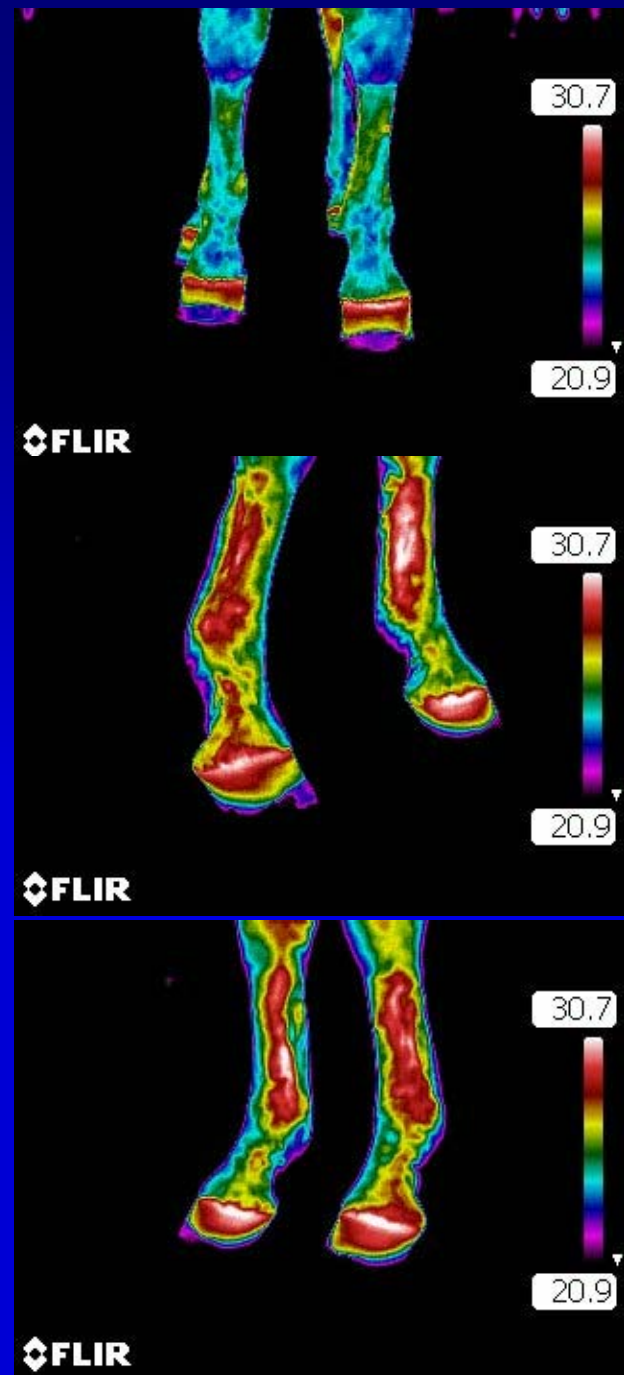
# Horse 4

- LF foot hot
- LF pastern cold
- RF pastern cold
- Medial hoof wall quarter hot RF/LF
- Inspection: general normal, locomotion normal, p.e. LF painful to palp
- Rads: LF –palmar angle



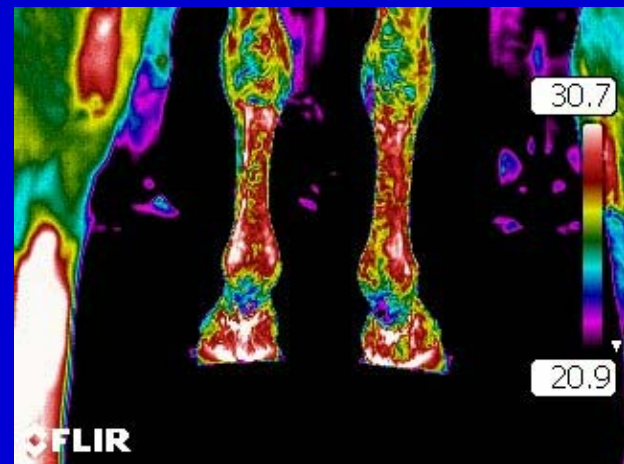
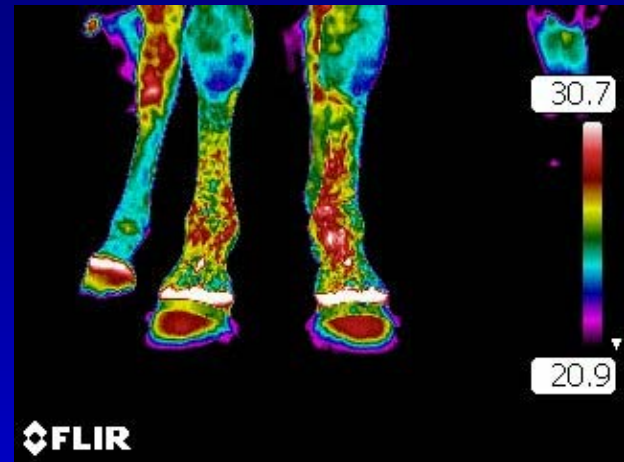
# Horse 5\*

- LF coronary band hot
- RF LF inside quarter hot
- Inspection: general normal, locomotion normal. P.e. normal, traveled high LF under saddle
- Rads WNL



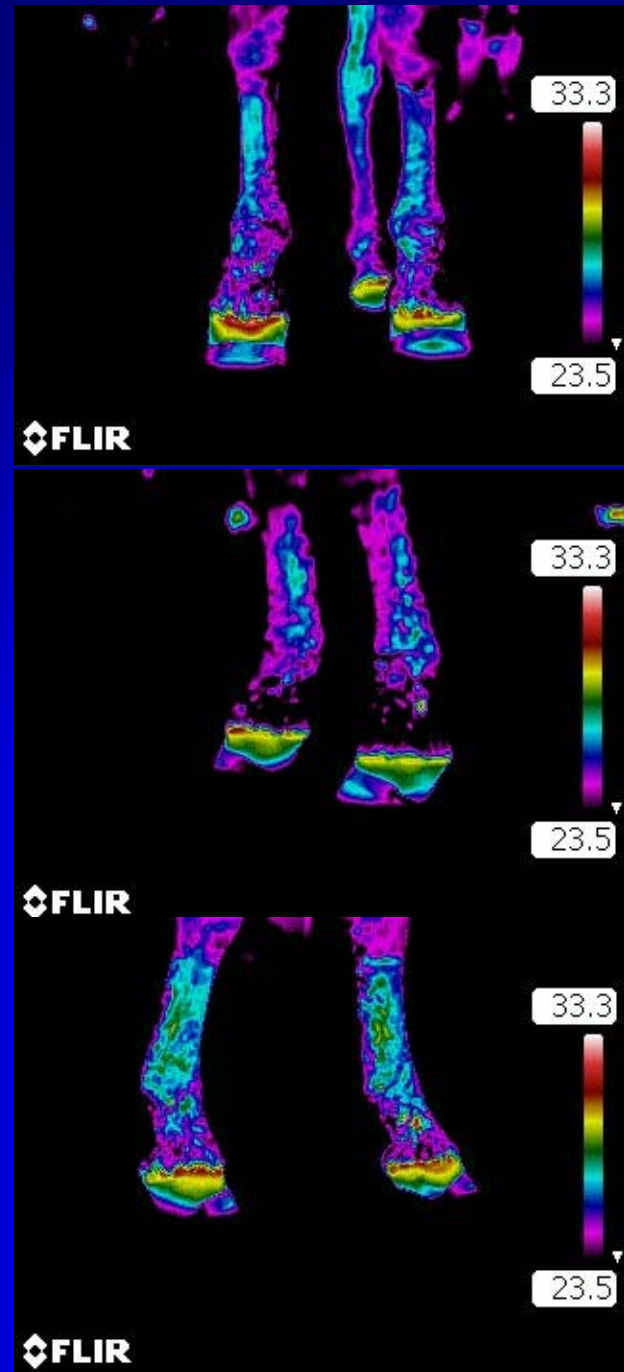
# Horse 6

- Hot wide coronary bands
- LF heat pastern
- Inspection: general normal, locomotion normal. P.e. very reactive both fore pasterns
- Rads WNL



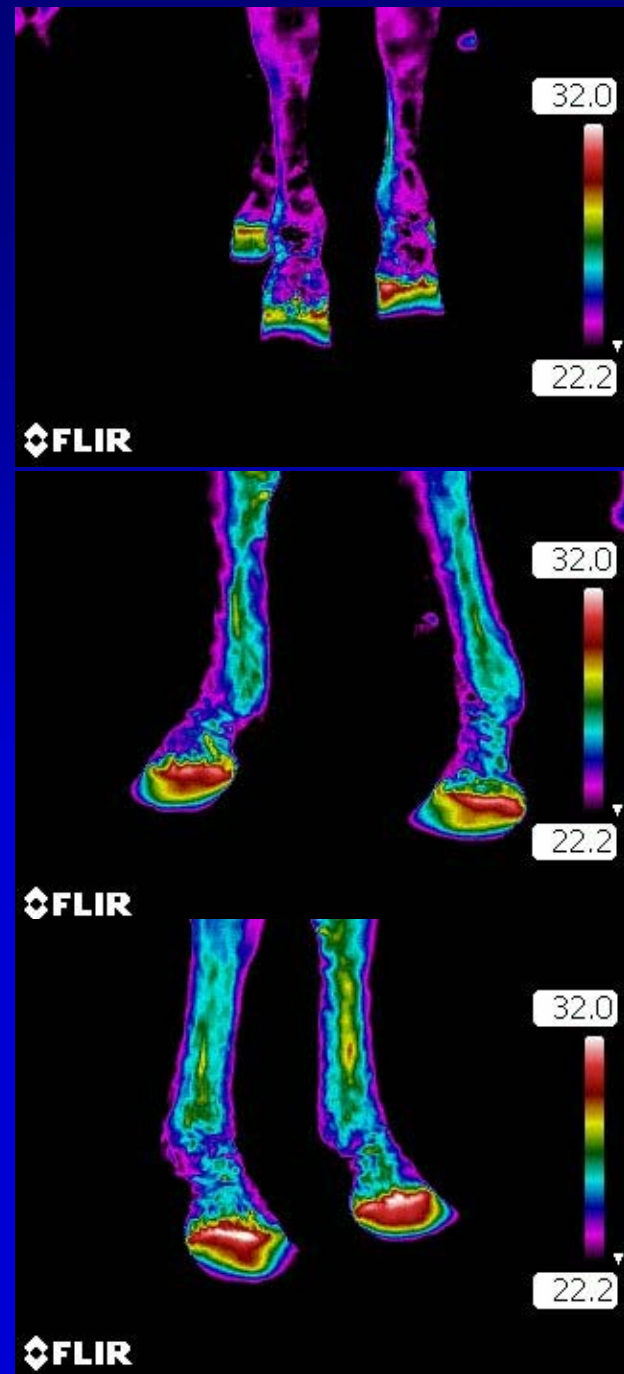
# Horse 7

- LF cold pastern
- RF hot coronary band toe
- Pastern asymmetry
- Heat medial quarter RF/LF
- Inspection: general normal, locomotion normal, p.e. LF consistent over pastern, RF over palmar pastern
- Rads RF dished toe LF – palmar angle



# Horse 8

- Hot LF coronary band
- Rf pastern hotter
- RF/LF cold toes
- Hot medial/lateral quarters LF/RF
- Inspection: general normal, locomotion abnormal, p.e. LF/RF +palp pastern hoof tester –
- Rads: severe chronic laminitis!!!!

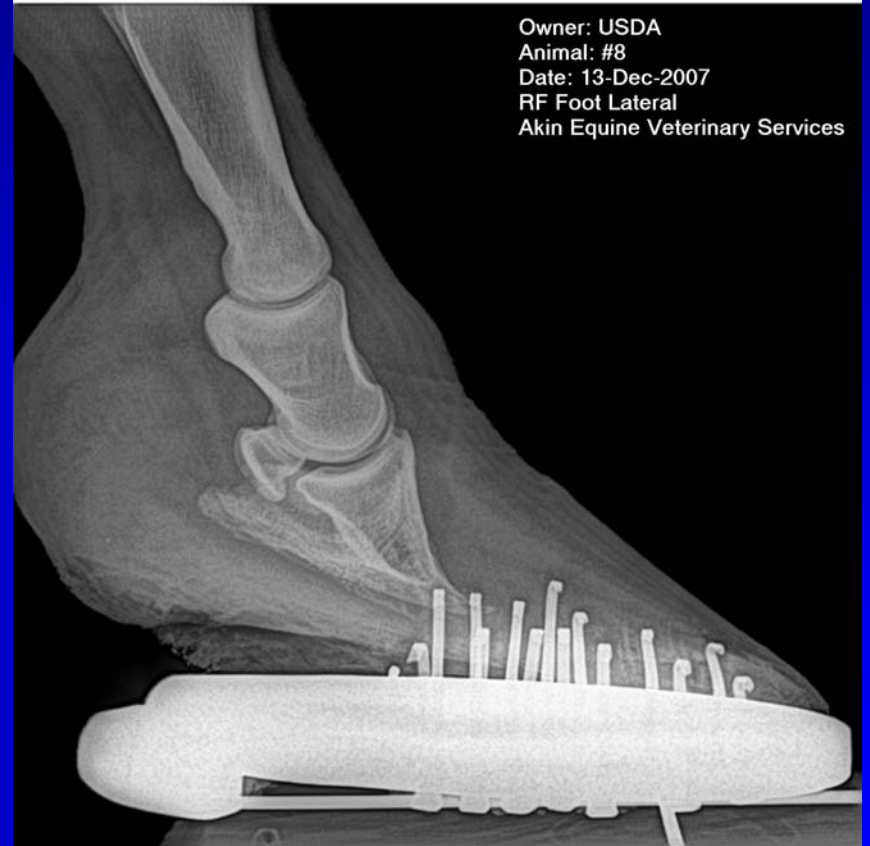


# HORSE 8

Owner: USDA  
Animal: #8  
Date: 13-Dec-2007  
LF Foot Lateral  
Akin Equine Veterinary Services



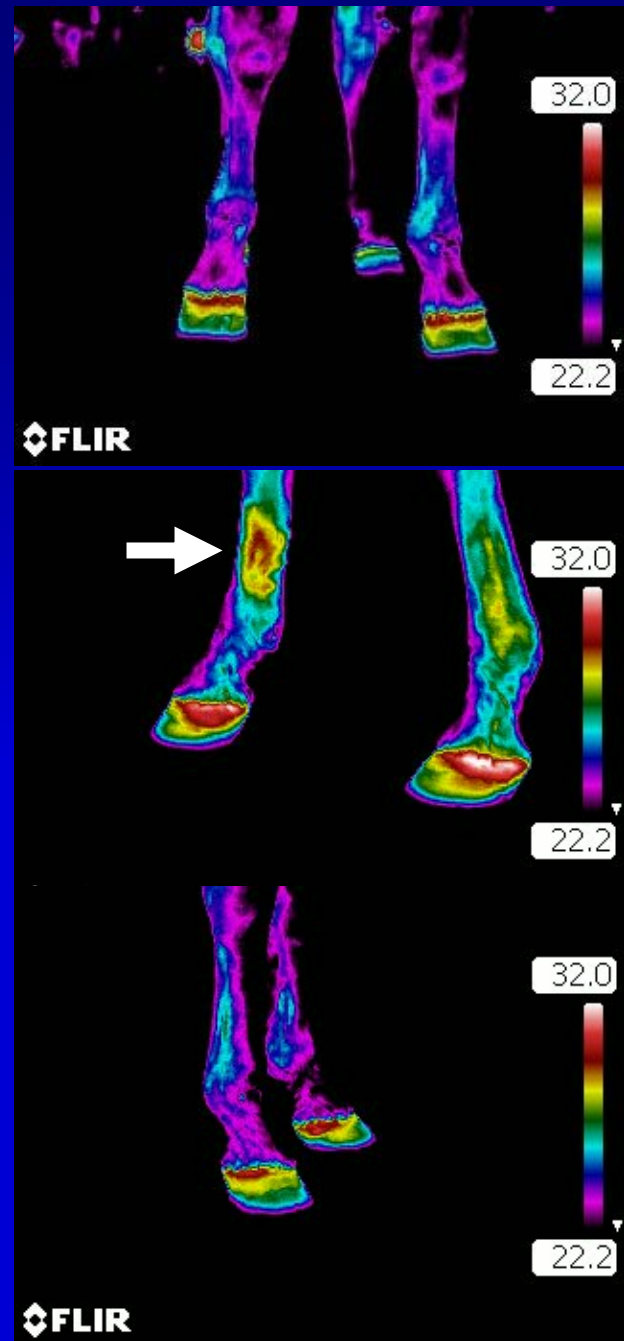
Owner: USDA  
Animal: #8  
Date: 13-Dec-2007  
RF Foot Lateral  
Akin Equine Veterinary Services





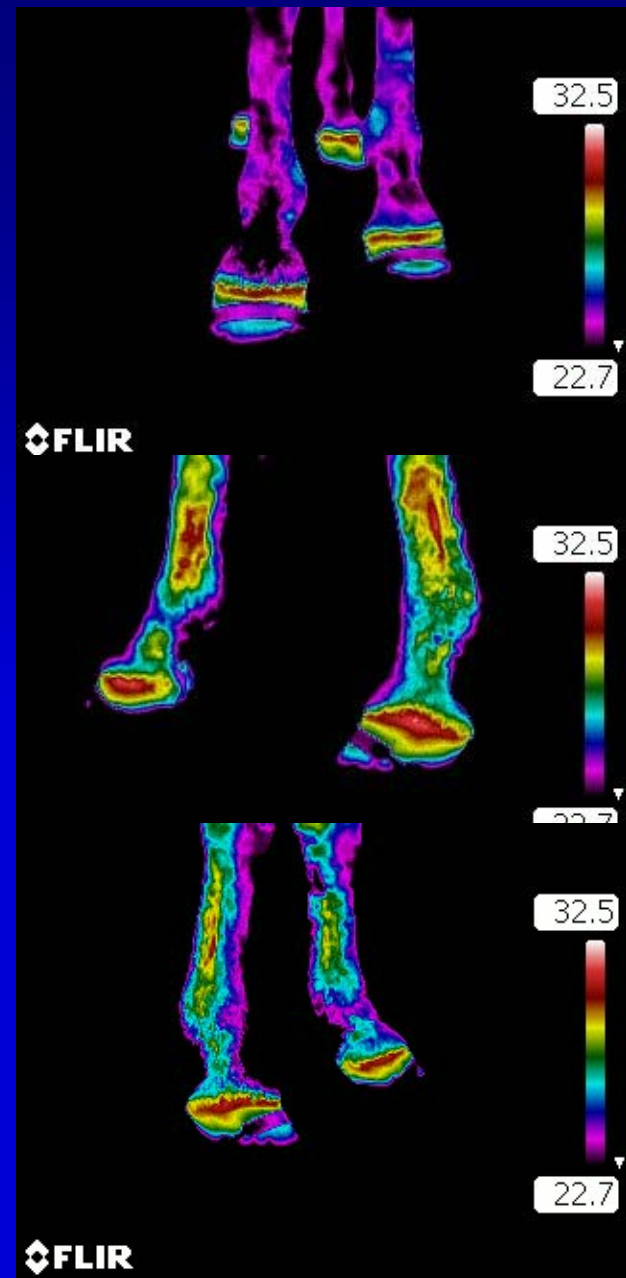
# Horse 9

- RF pastern warmer  
LF, LF cold
- LF lateral quarter
- RF medial quarter
- Inspection: general  
normal, locomotion,  
normal, p.e. normal
- Rads: WNL



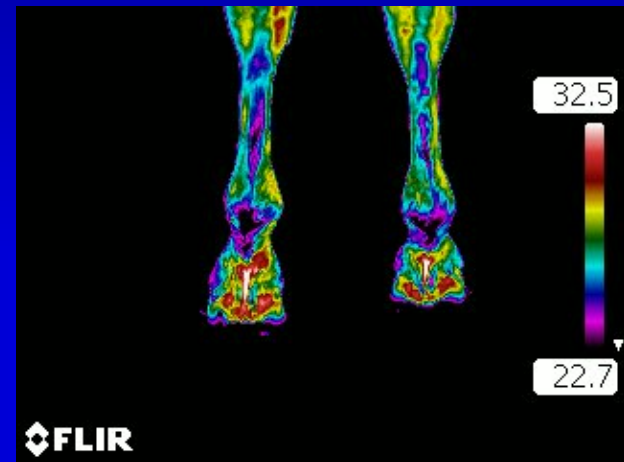
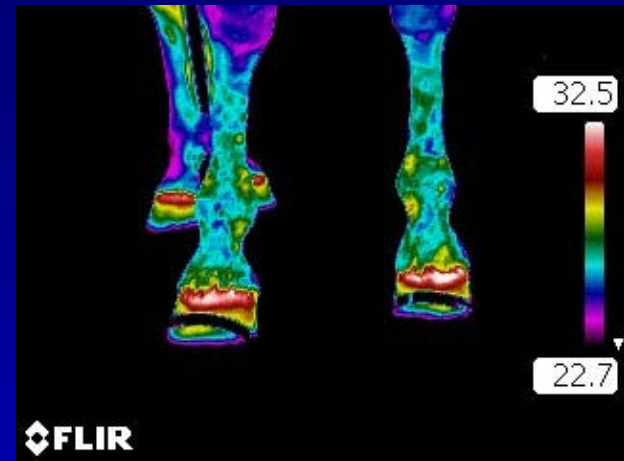
# Horse 10

- Pasterns cold R>L
- Hot quarters lateral RF/LF
- Inspection: general normal, locomotion normal, p.e. mild +hoof testers RF @toe, sunscreen applied to pasterns
- Rads WNL



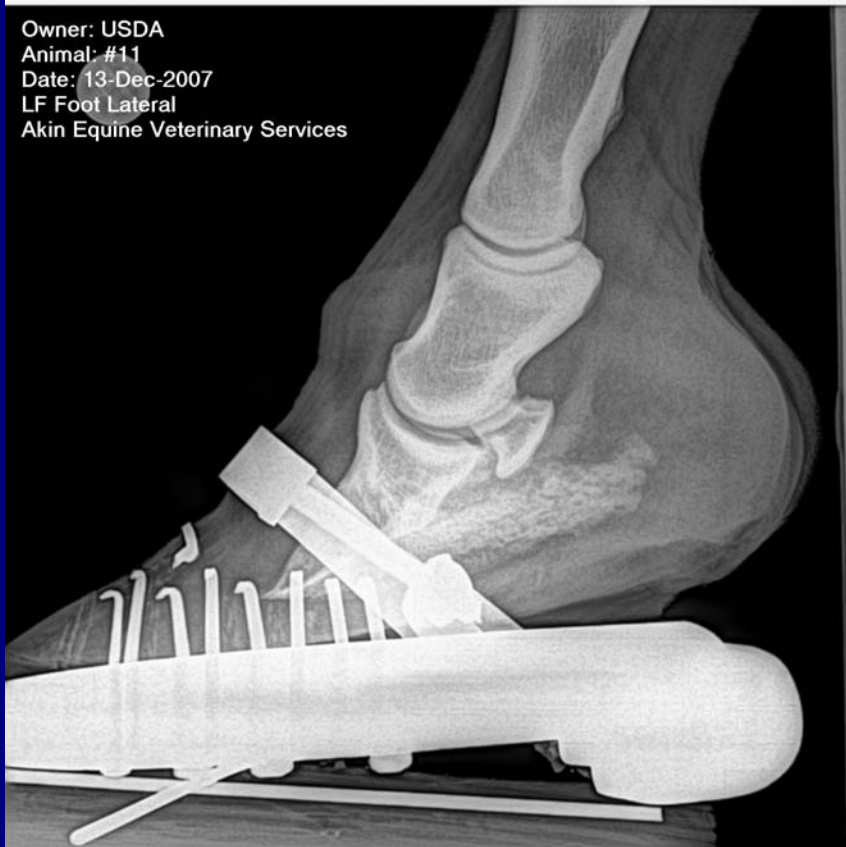
# Horse 11

- Irregular coronary band
- Coronary hairline hot
- LF medial pastern
- Inspection: general normal, locomotion normal, p.e. +palp RF/LF + hoof testers RF/LF
- Rads; moderate p3 rotation



# HORSE 11

Owner: USDA  
Animal: #11  
Date: 13-Dec-2007  
LF Foot Lateral  
Akin Equine Veterinary Services

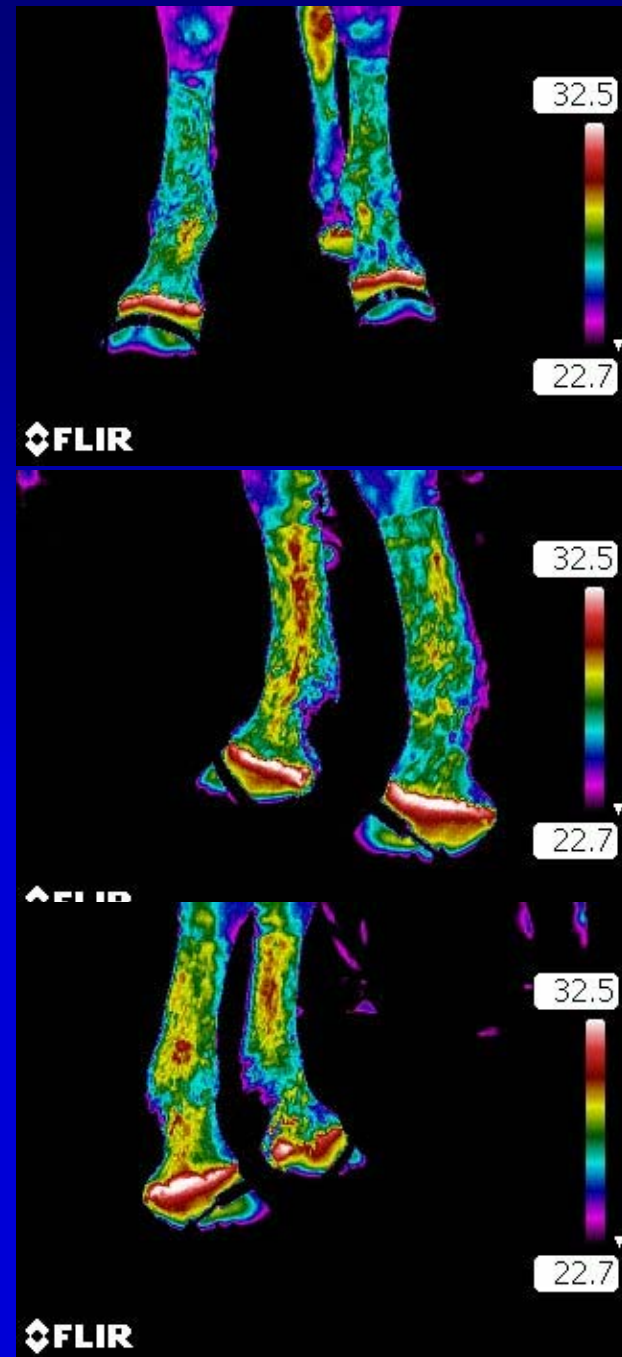


Owner: USDA  
Animal: #11  
Date: 13-Dec-2007  
RF Foot Lateral  
Akin Equine Veterinary Services



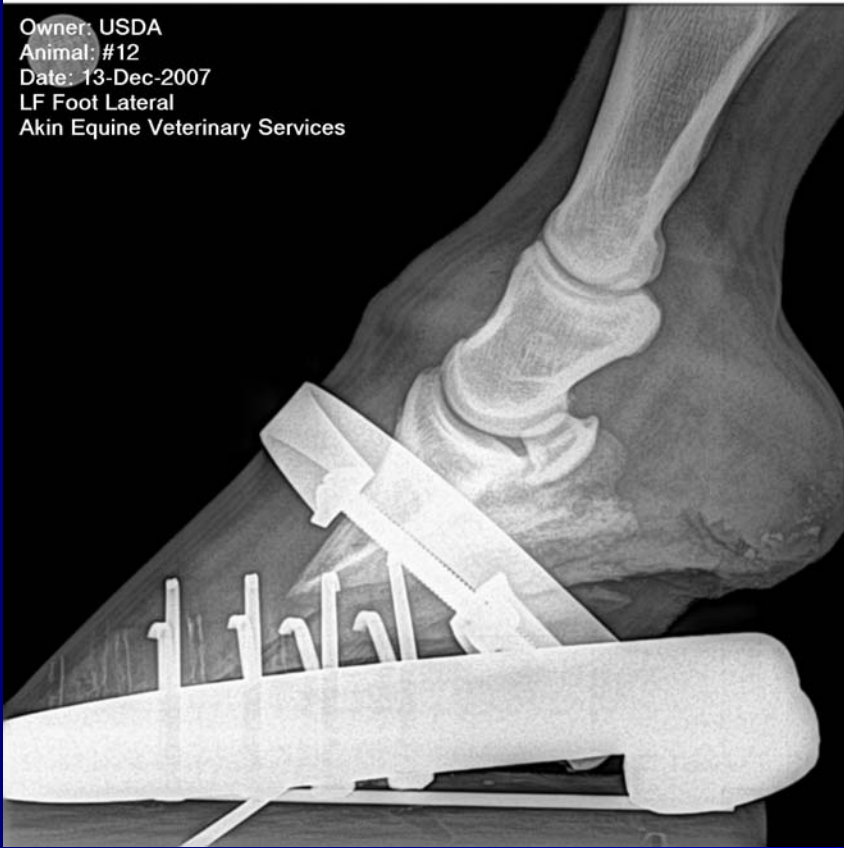
# Horse 12

- Abnormal pasterns
- Abnormal hooves @toes
- RF heat lateral quarter heel
- LF medial quarter
- Inspection: general normal, locomotion normal, p.e.+hoof testers RF/LF
- Rads LF lg horizontal crack at toe, mild rotation RF/LF



# HORSE 12

Owner: USDA  
Animal: #12  
Date: 13-Dec-2007  
LF Foot Lateral  
Akin Equine Veterinary Services

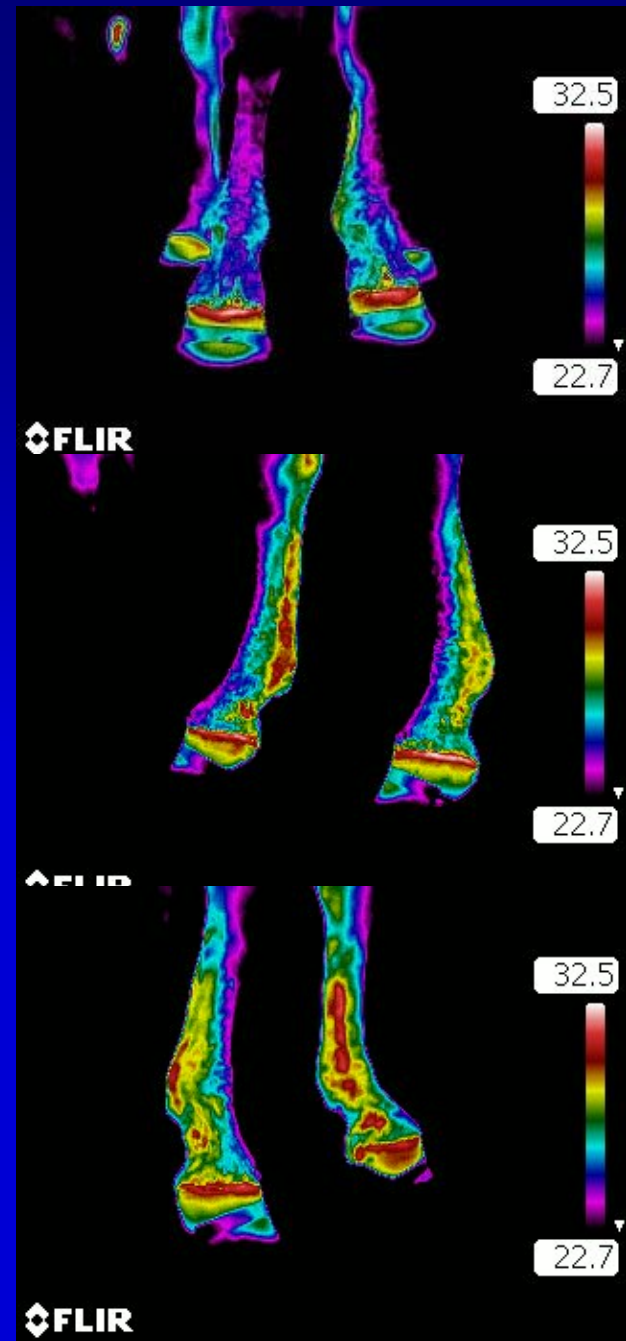


Owner: USDA  
Animal: #12  
Date: 13-Dec-2007  
RF Foot Lateral  
Akin Equine Veterinary Services



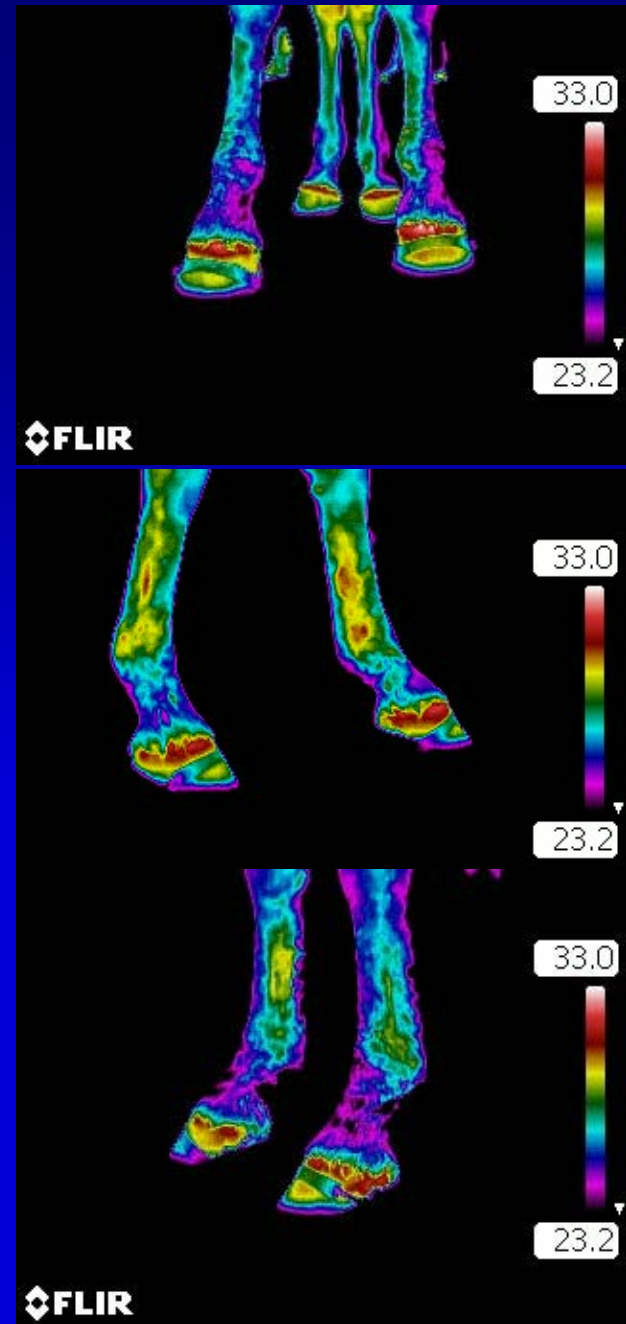
# Horse 13

- Coronary band too wide RF heat @toe
- LF pastern hot
- LF medial pastern
- LF medial wall
- Inspection: general normal, locomotion normal, p.e. LF+pastern
- Rads:WNL



# Horse 14

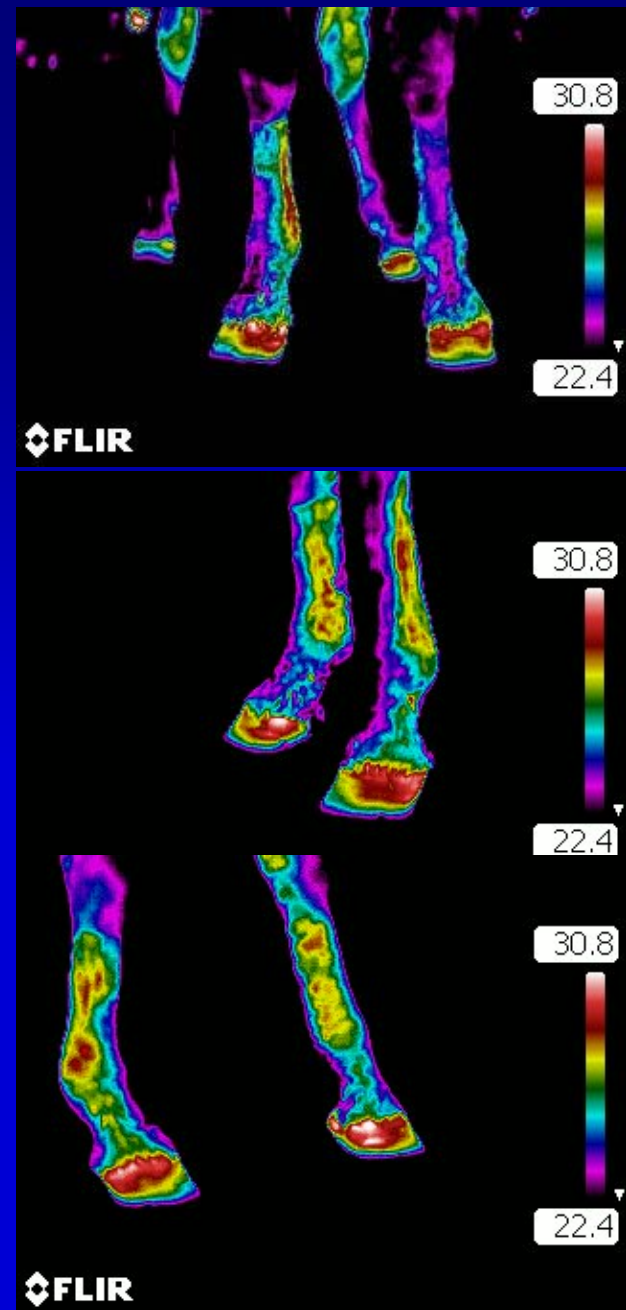
- LF heat @toe
- LF pastern cold lateral
- RF pastern cold
- LF cold spotchy
- Rf cold
- Coronary bands wide
- Inspection: general normal, locomotion normal, p.e.+LF pastern
- Rads:-palmar angle  $L < R$





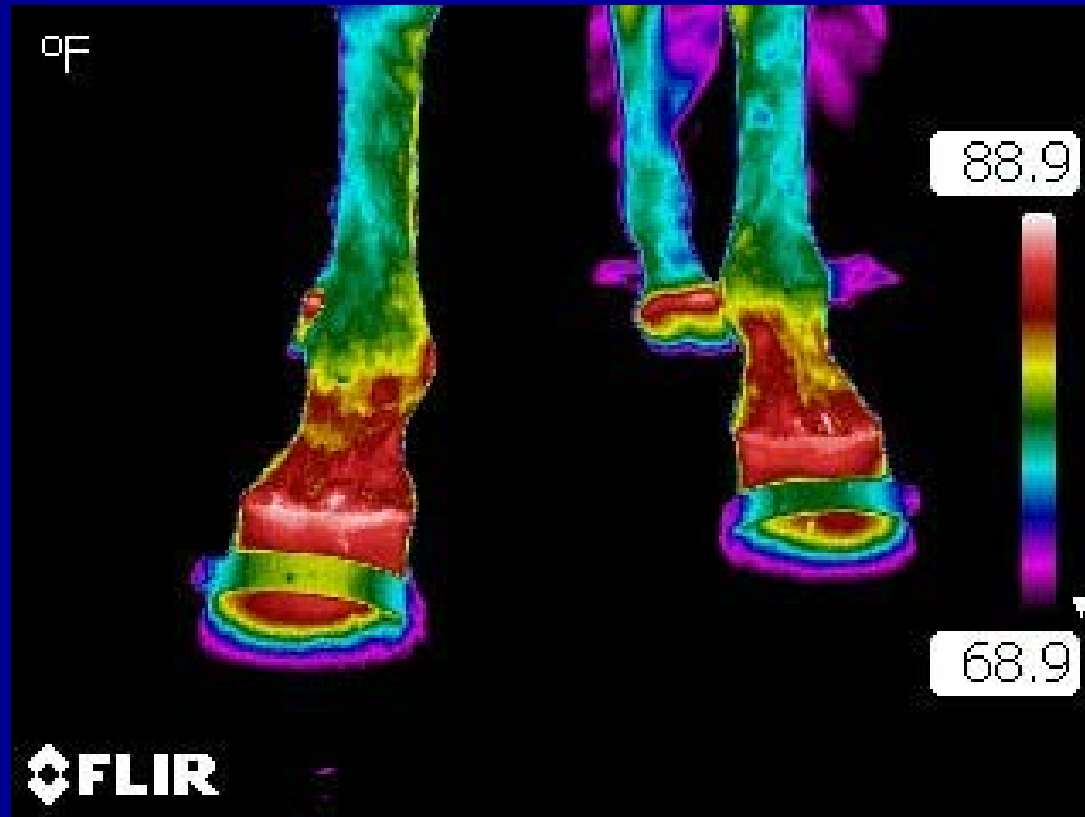
# Horse 15

- RF medial hoof
- RF lateral cold pastern
- LF heat quarters
- Heat lateral heel quarter LF, medial HOT
- RF heat medial quarter
- Inspection: general normal, locomotion normal, p.e. normal
- Rads: WNL



# OTHER RESULTS

## ➤ “TREATED PASTER”



3 MONTHS POST  
TREATMENT

# OTHER RESULTS

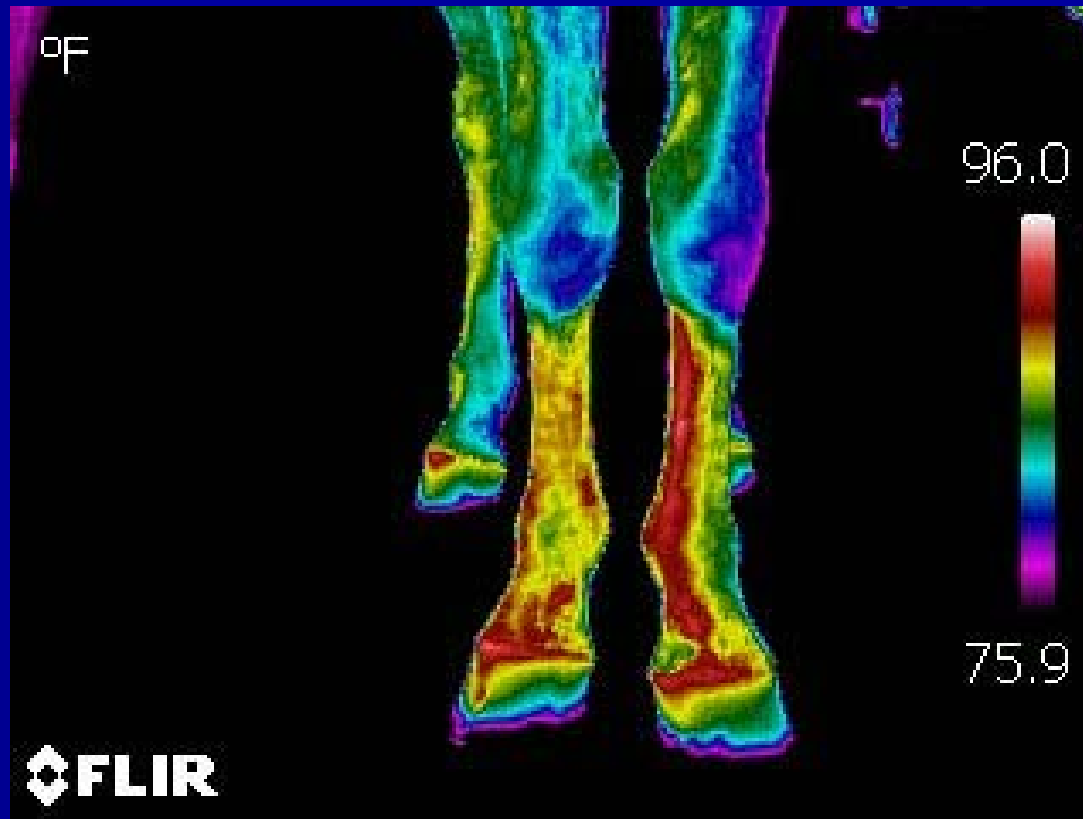
## ➤ “GO-JO TREATED”



**TECHNOLOGY SHOWS  
EXACTLY WHERE**

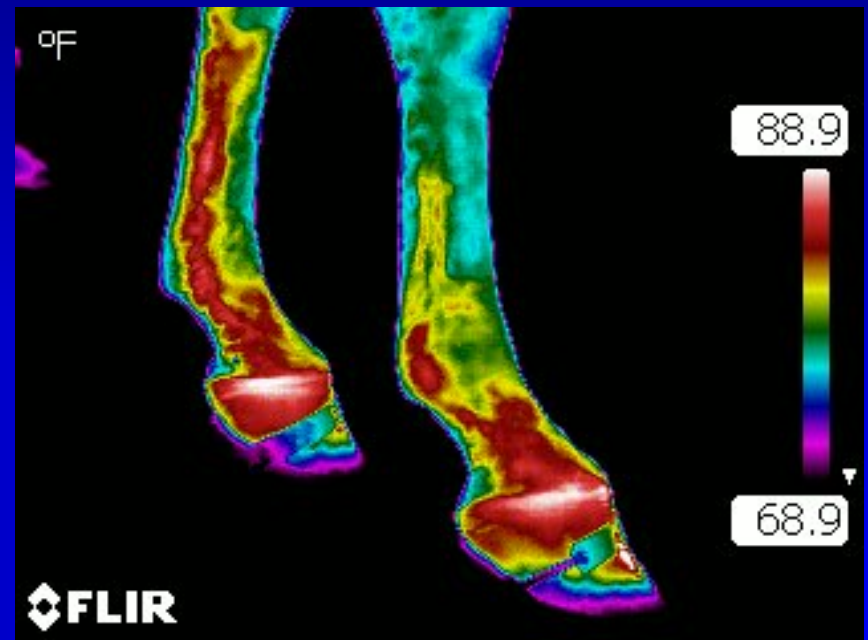
# OTHER RESULTS

- “EXCESSIVE WORK 3 HOURS EARLIER”



# CONCLUSION

- This study supports previous findings that thermography can be used to determine if a horse is in compliance with the Horse Protection Act.



# **Future Plans for Regulatory Use**

- **Horses deemed “not normal” will be either excused from competition, or referred for further veterinary evaluation**
- **2008 Season will see thermography introduced**
- **Plans are to incorporate thermographic imaging as part of the inspection process for 2009 show season**

QUESTIONS?

