UTILIZING THERMOGRAPHY to ASSESS COMPLIANCE with THE HORSE PROTECTION ACT

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- 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
THERMAL PATTERN

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

- 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.

<table>
<thead>
<tr>
<th>Research Activities</th>
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<tr>
<td>1) Pre-exercise Thermographic exam</td>
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<td>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.</td>
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<td>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.</td>
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<td>4) Post Exercise Physical exam</td>
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<td>5) Post Exercise Thermal Exam</td>
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<td>Horses allowed to cool out and rest.</td>
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<td>6) Horses all received DP and Lateral Digital Radiographs of all four feet.</td>
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<td>7) 2 hour post exercise Physical Exam.</td>
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<td>8) 2 hour post exercise Thermal Exam.</td>
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<td>Horse 1 excused from evaluation</td>
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RESULTS

- 15 HORSES EXAMINED, 1 WAS NORMAL
- 5 HORSES HAD AN ABNORMAL PASTERN
- 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 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 at 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 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 PASTERN”

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?