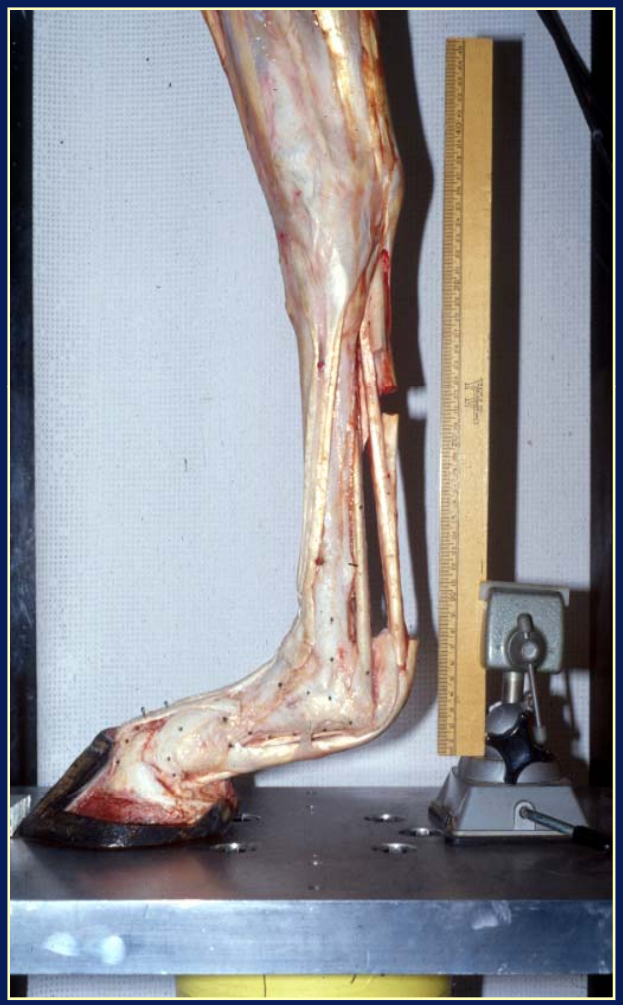
Musculoskeletal Injuries

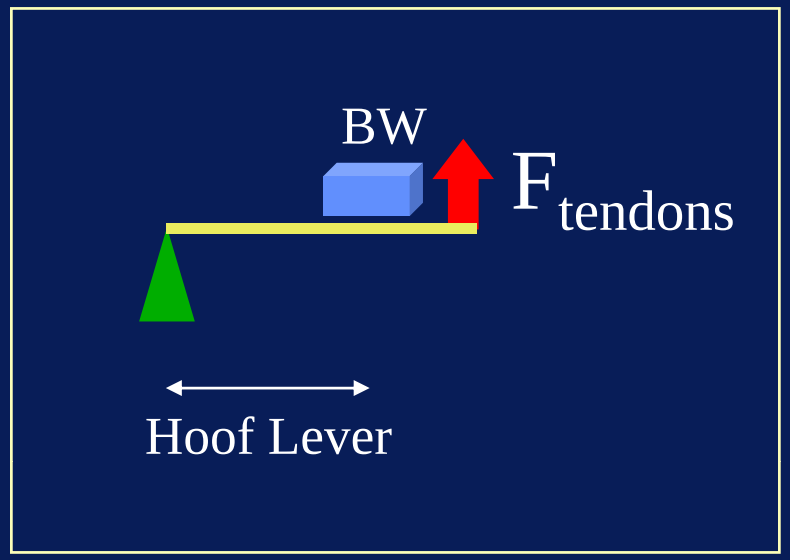
Chris Pollit

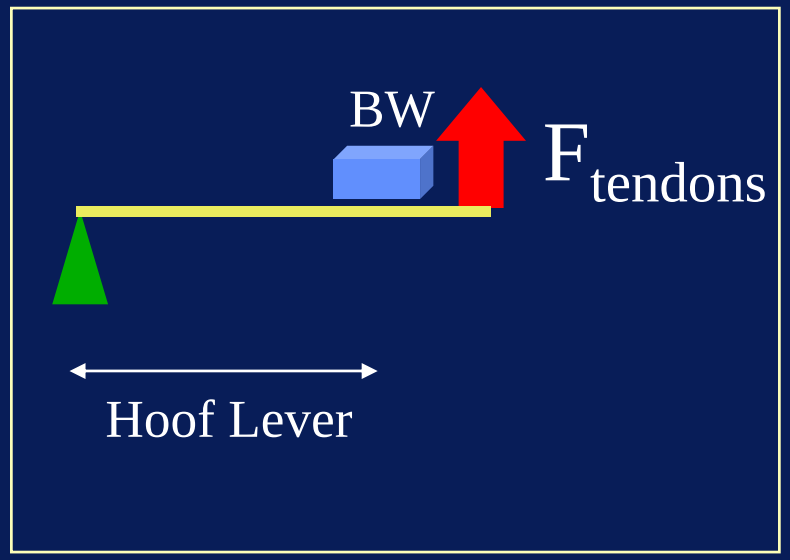
Multifactorial

- hoof conformation, shoes
- pre-existing injury
- training regimen
- track surface
- …

Musculoskeletal Injury	Tb (%)
Fetlock Support Injuries	
proximal sesamoid bone fractures	***34***
suspensory apparatus rupture	
Metacarpal Fractures condylar fractures and non-condylar fractures	19
Humeral Fracture	9
Carpal Fracture	7
Proximal Phalangeal Fracture	4
Metatarsal Fracture	4
Pelvic Fracture	3
Tibial Fracture	2
Vertebral Fracture	2
Scapular Fracture	2



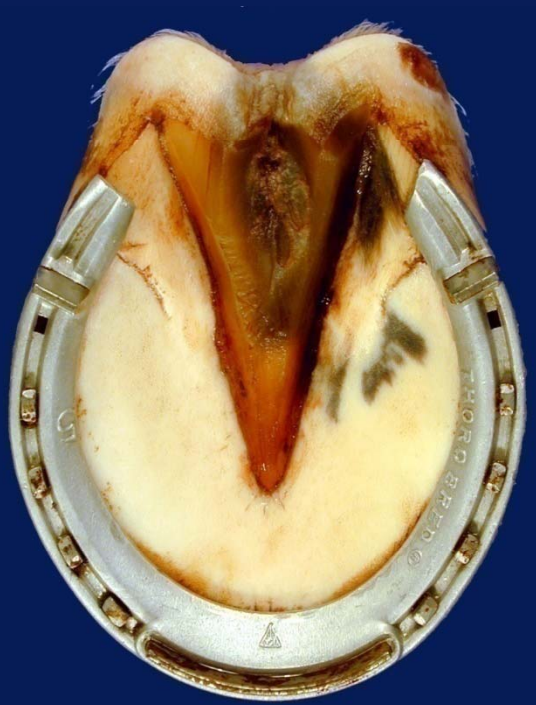

BW
F tendons
Hoof Lever


BW
F tendons
Hoof Lever

Increased Risk for SAF

High toe grabs

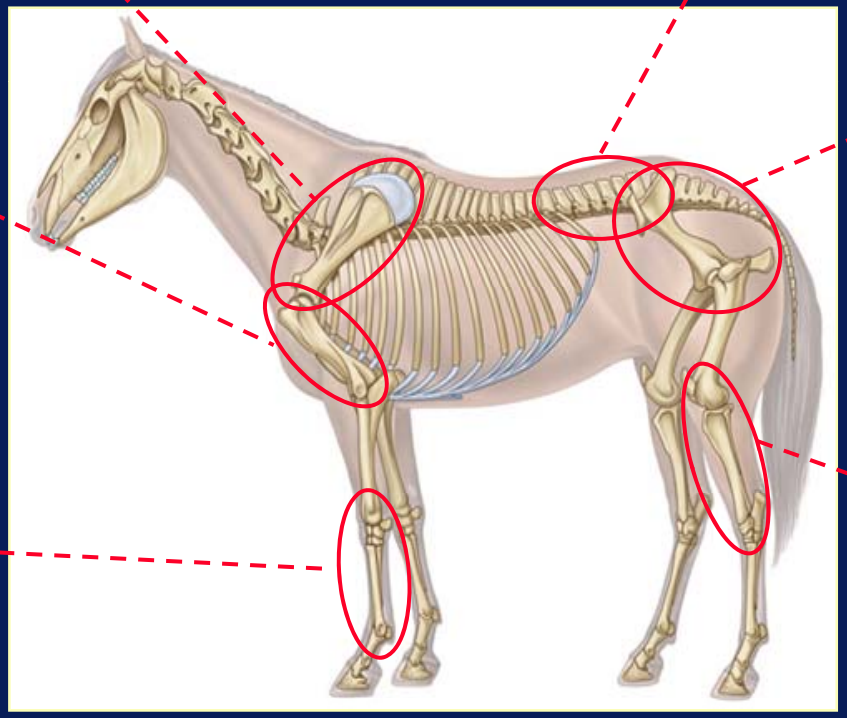
Long toe / under-run heel

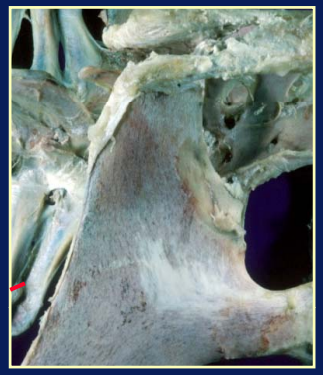


Kane, et al. AJVR 1996;57:1147-1152

Balch, et al. AAEP 2002;47:334-338

Pre-existing Injuries

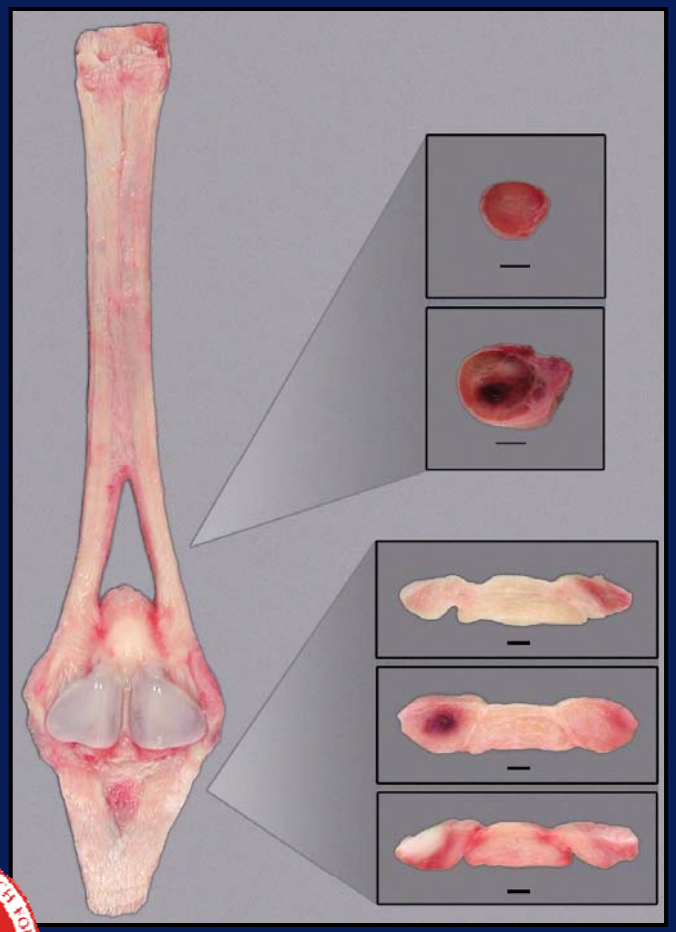


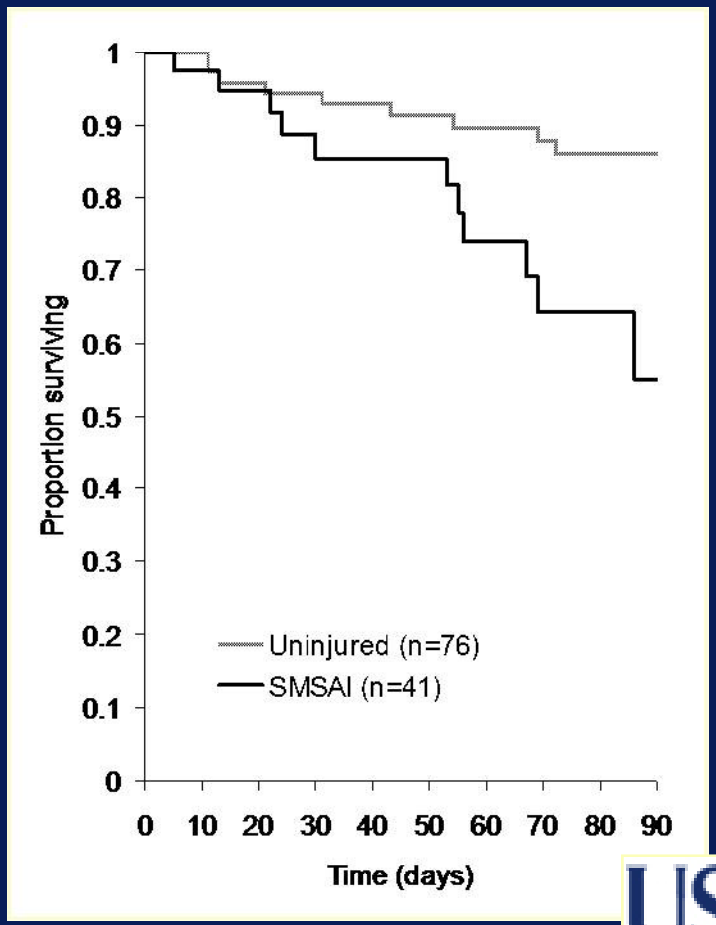


Haussler, Stover. Equine Vet J 1998;30:374-381

Stover. Current Tech, Equine Surg Lameness 1998:451-459

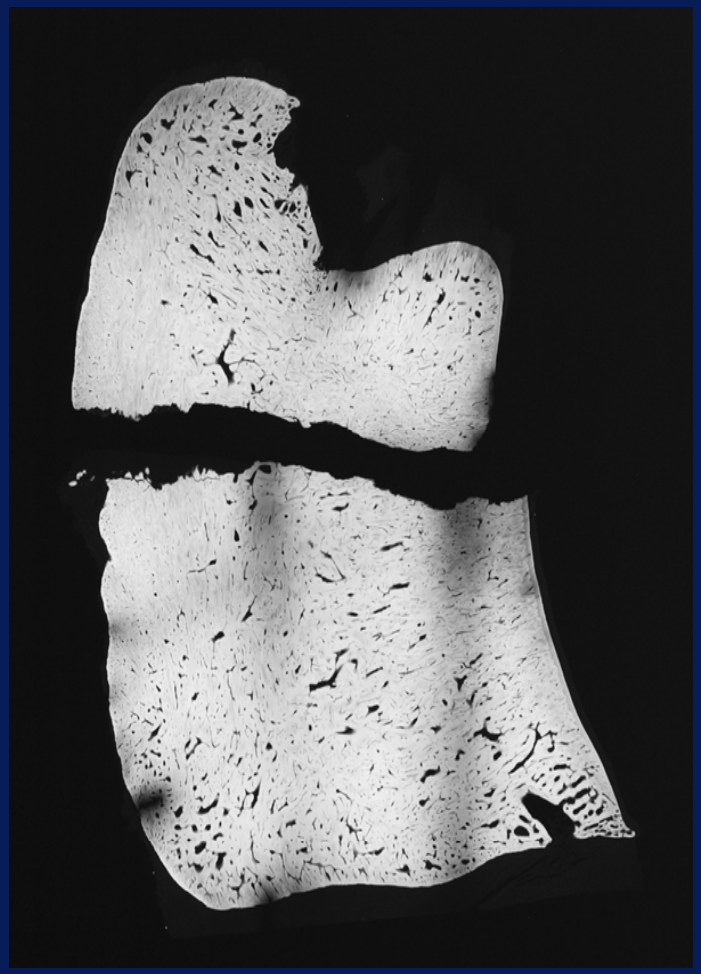
Mild Injuries Shorten Careers

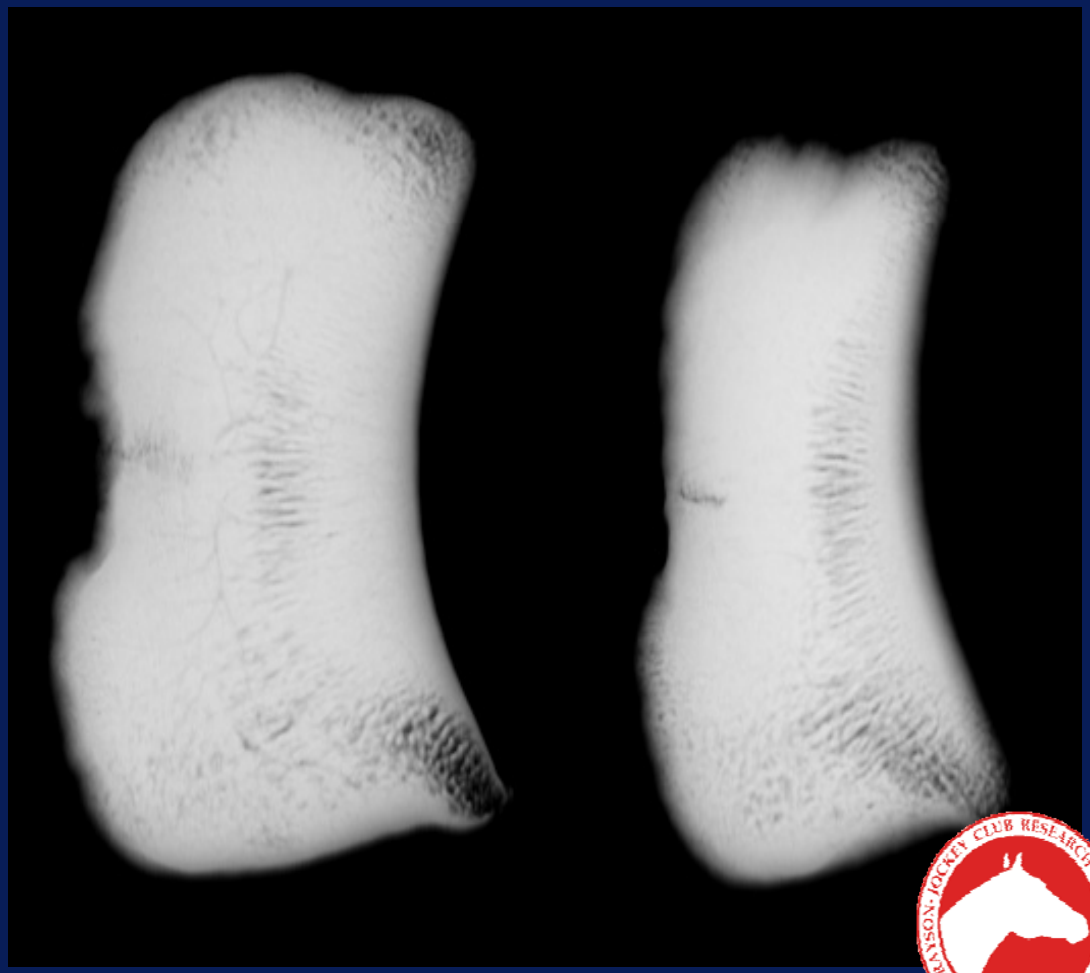




Hill, et al. JAVMA 2001;218:1136-1144

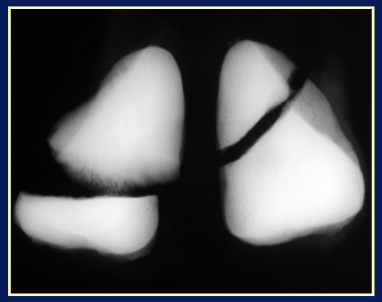
Evidence of pre-existing disease





Fatal Musculoskeletal Injuries (FMI)

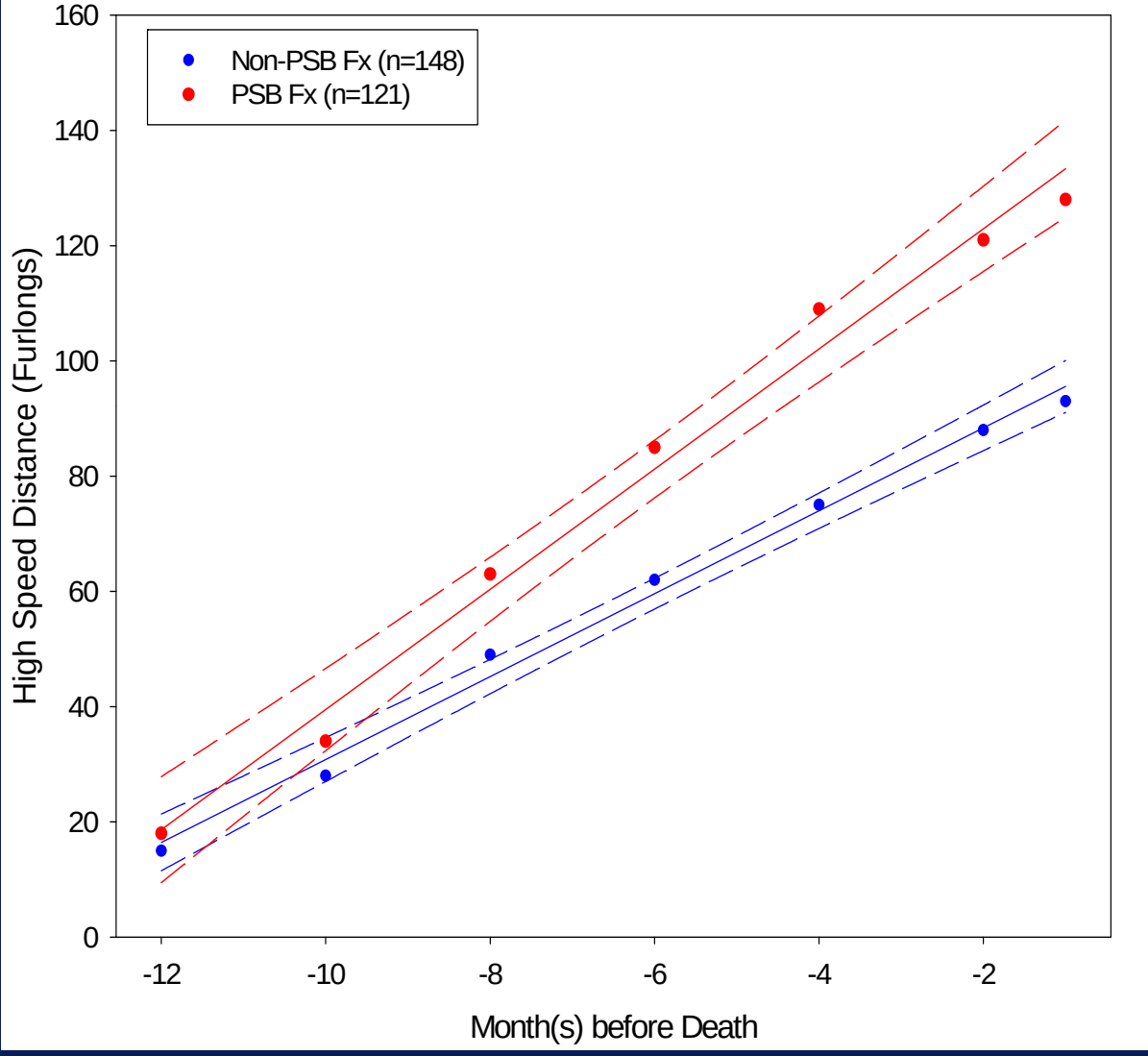
Training Effect



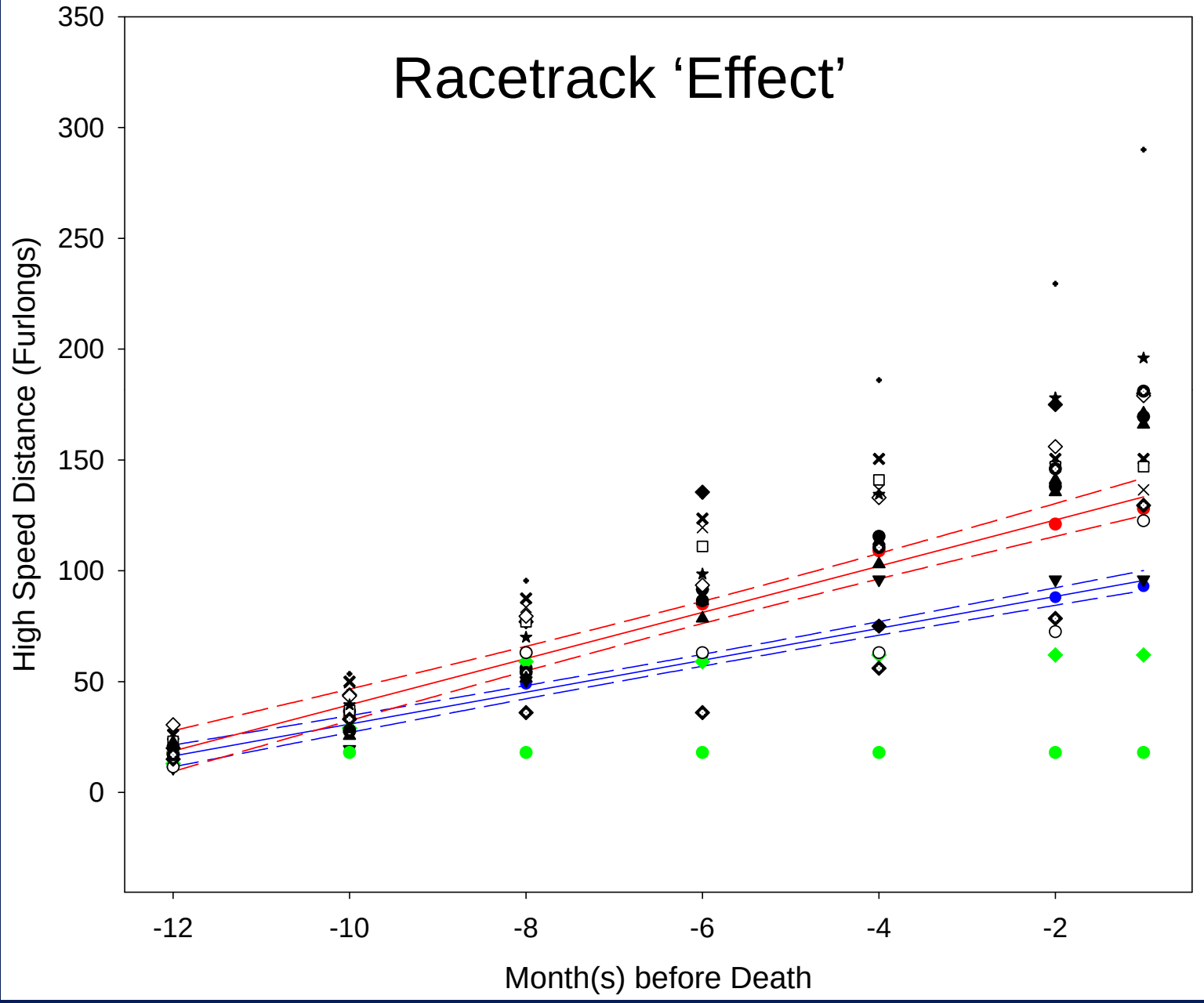
Proximal Sesamoid Bone Fracture

	Non-PSB Death	PSB Fracture
# Works	21	26
# Races	6	8
Races/yr	4.7	6.4
Days since layup	46	153

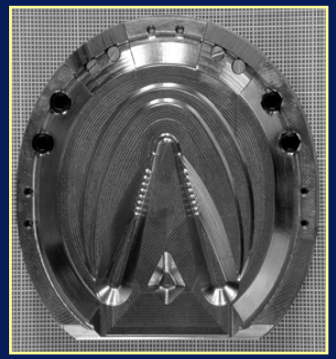
Anthenill, et al. Am J Vet Res 2007

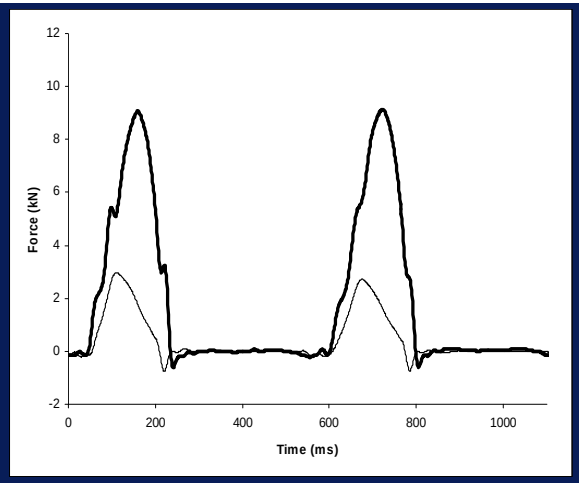


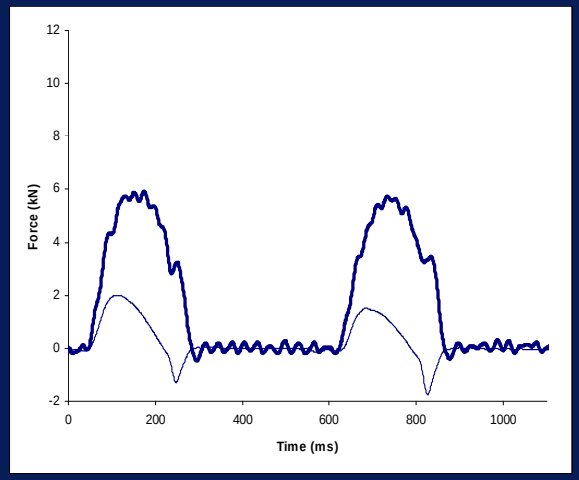
Anthenill, et al. Am J Vet 2007;68:760-771

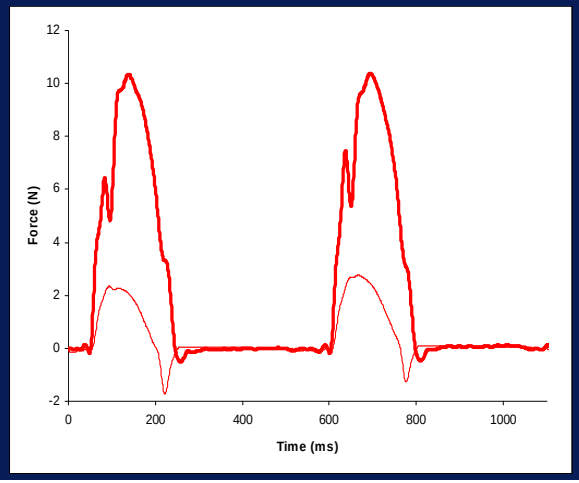

Racetrack 'Effect'
High Speed Distance (Furlongs)
350
300
250
200
150
100
50
0
-12
-10
-8
-6
-4
-2
Month(s) before Death

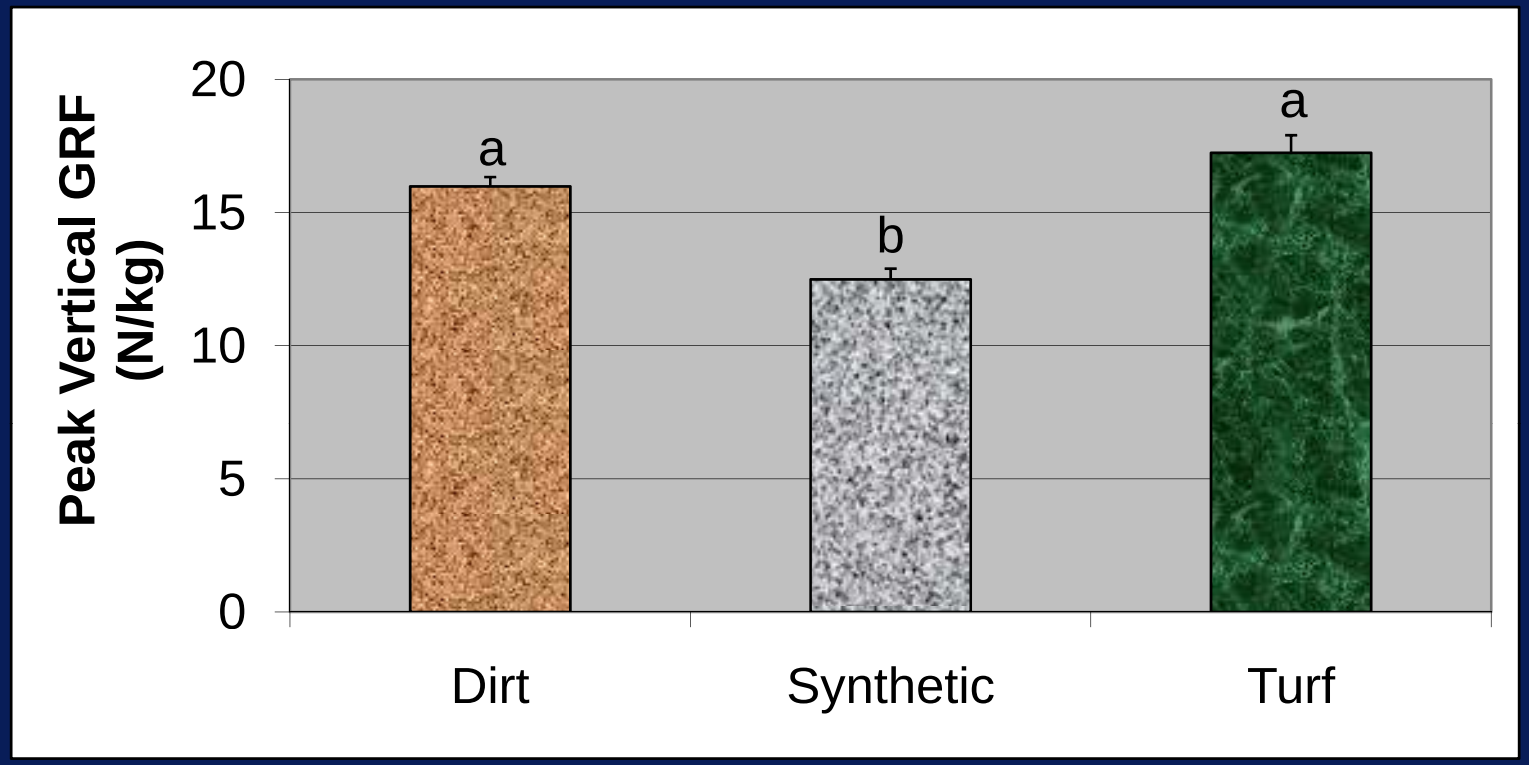
Racetrack Surface



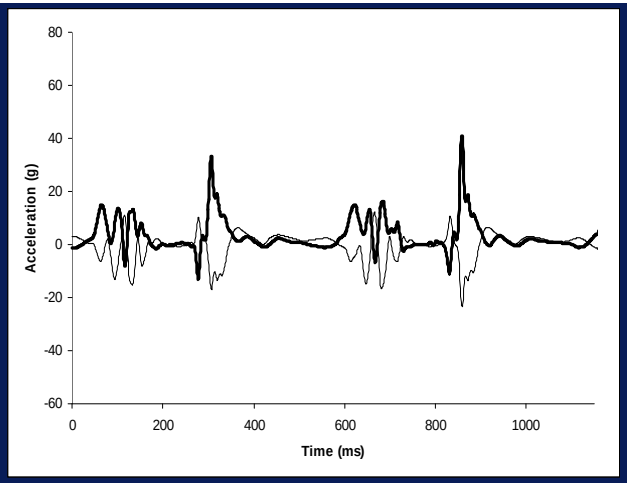

Force (kN)
Time (ms)
12
10
8
6
4
2
0
-2
0
200
400
600
800
1000

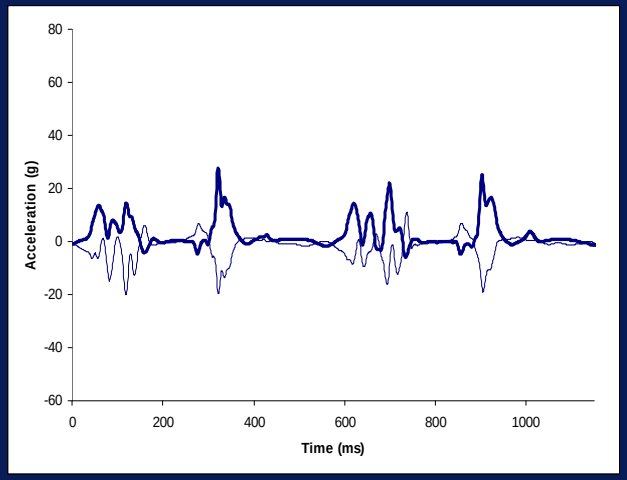

Force (kN)
Time (ms)
12
10
8
6
4
2
0
-2
0
200
400
600
800
1000

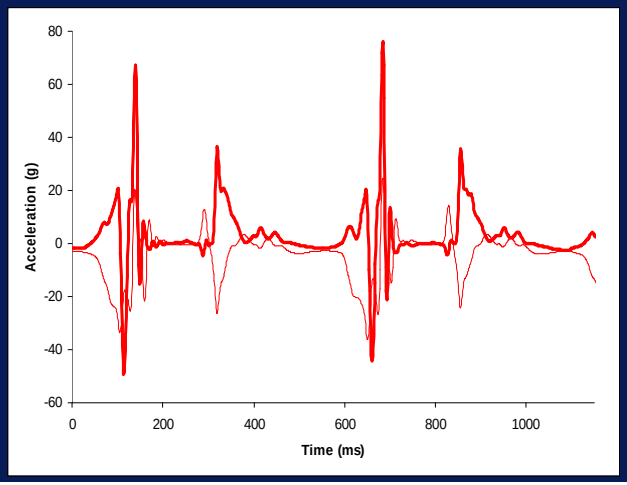

Force (N)
Time (ms)
12
10
8
6
4
2
0
-2
0
200
400
600
800
1000

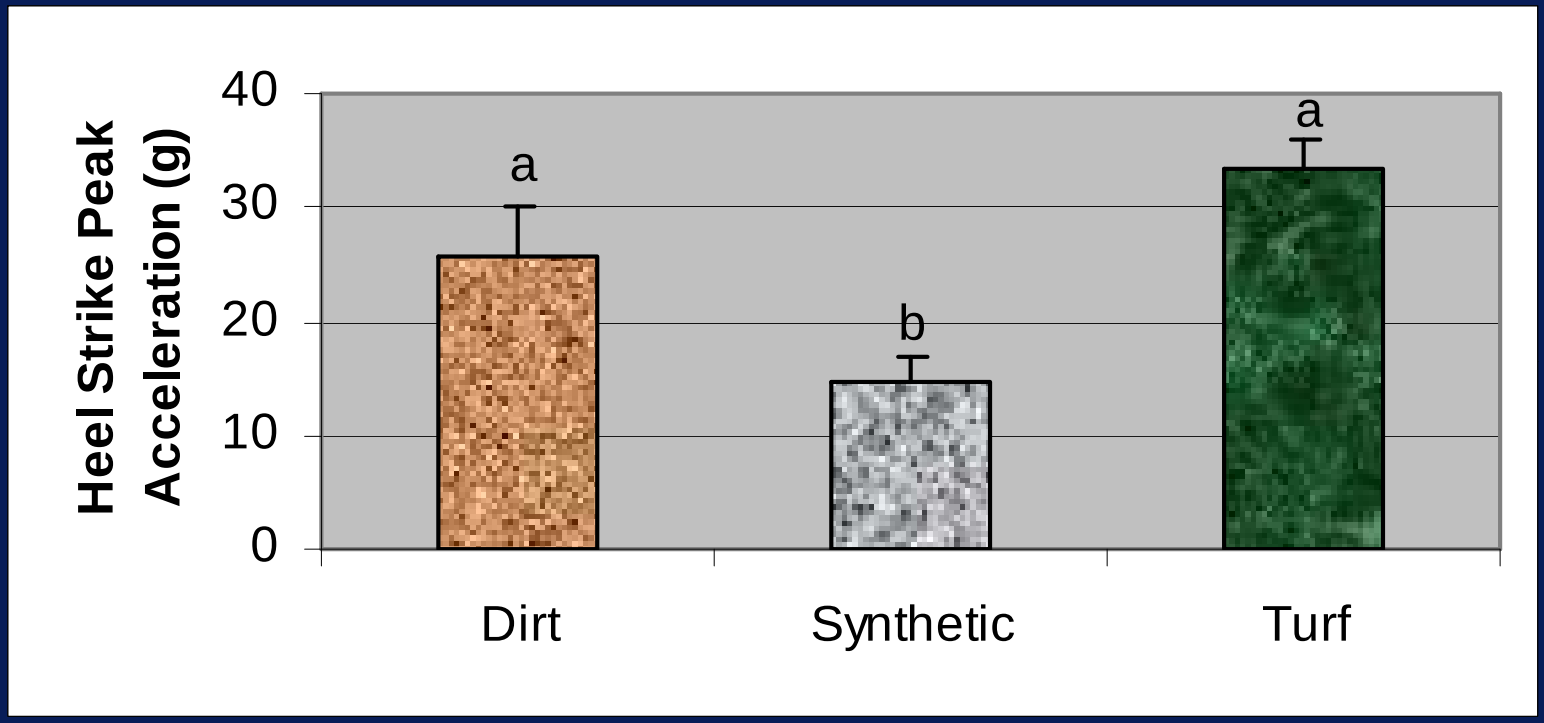


$p < 0.10$

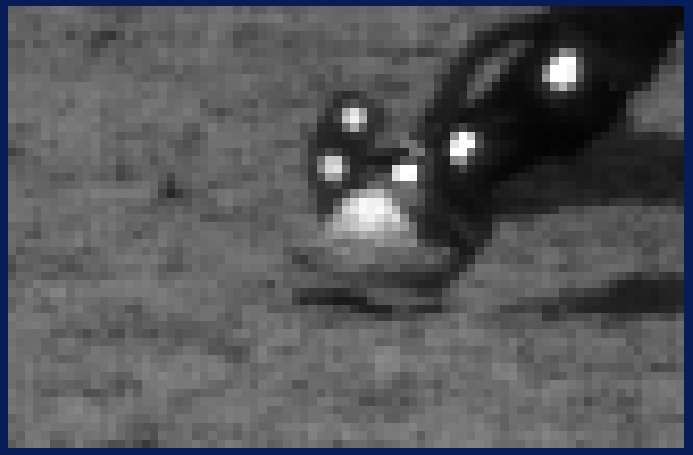

Acceleration (g)
80
60
40
20
0
-20
-40
-60
0
200
400
600
800
1000
Time (ms)

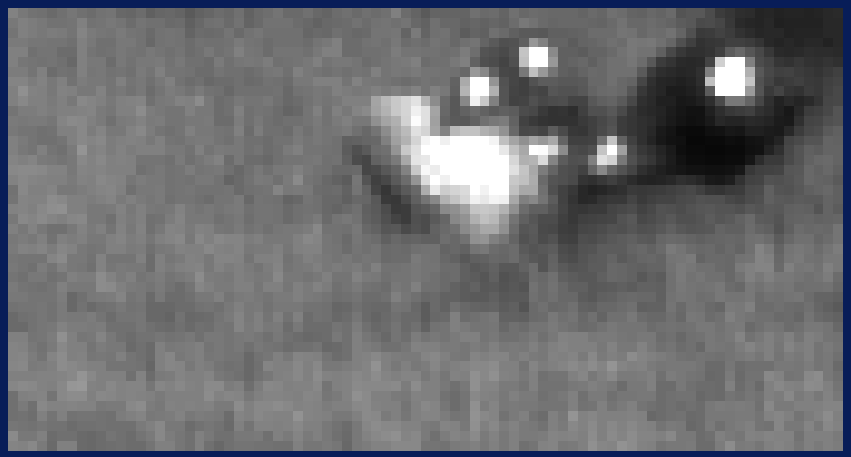

Acceleration (g)
80
60
40
20
0
-20
-40
-60
0
200
400
600
800
1000
Time (ms)


Acceleration (g)
80
60
40
20
0
-20
-40
-60
0
200
400
600
800
1000
Time (ms)


Heel Strike Peak Acceleration (g)
40
30
20
10
0
a
b
a
Dirt
Synthetic
Turf

Interaction of Hoof with Surface

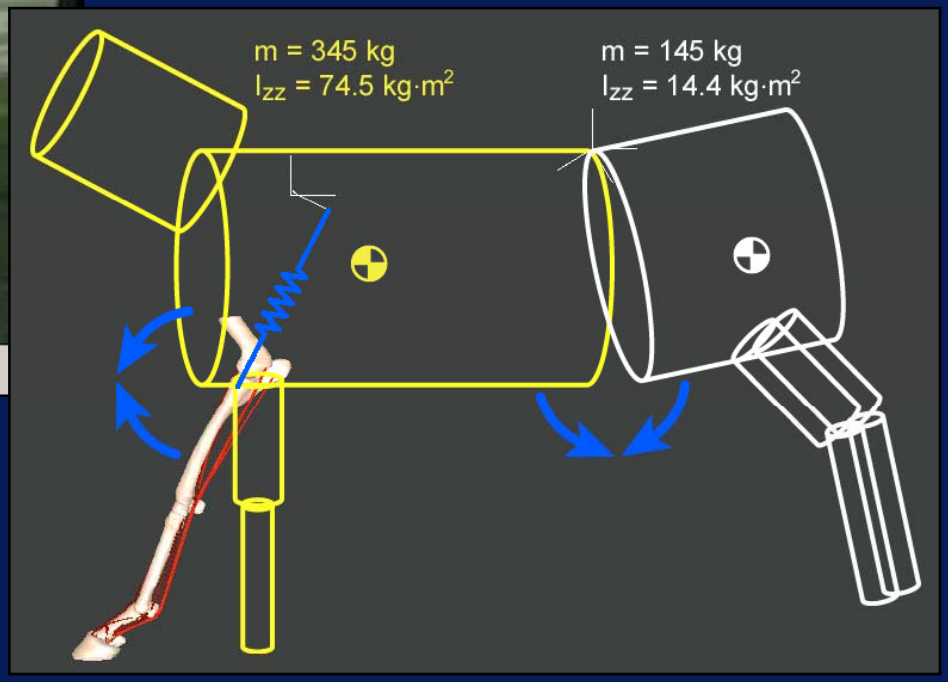




Future Research Goals

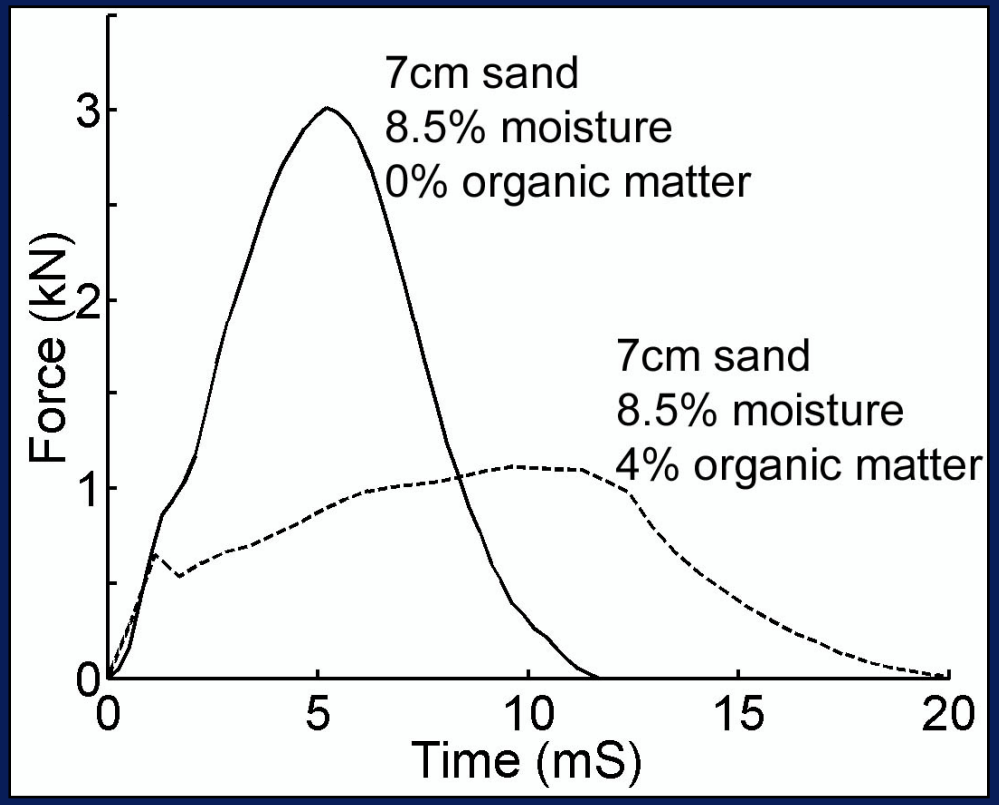
- Computer modeling of race surfaces and hoof interface for the scientific ***design*** of optimal surface materials and hoof appliances to prevent injury

Computer Model/Simulation



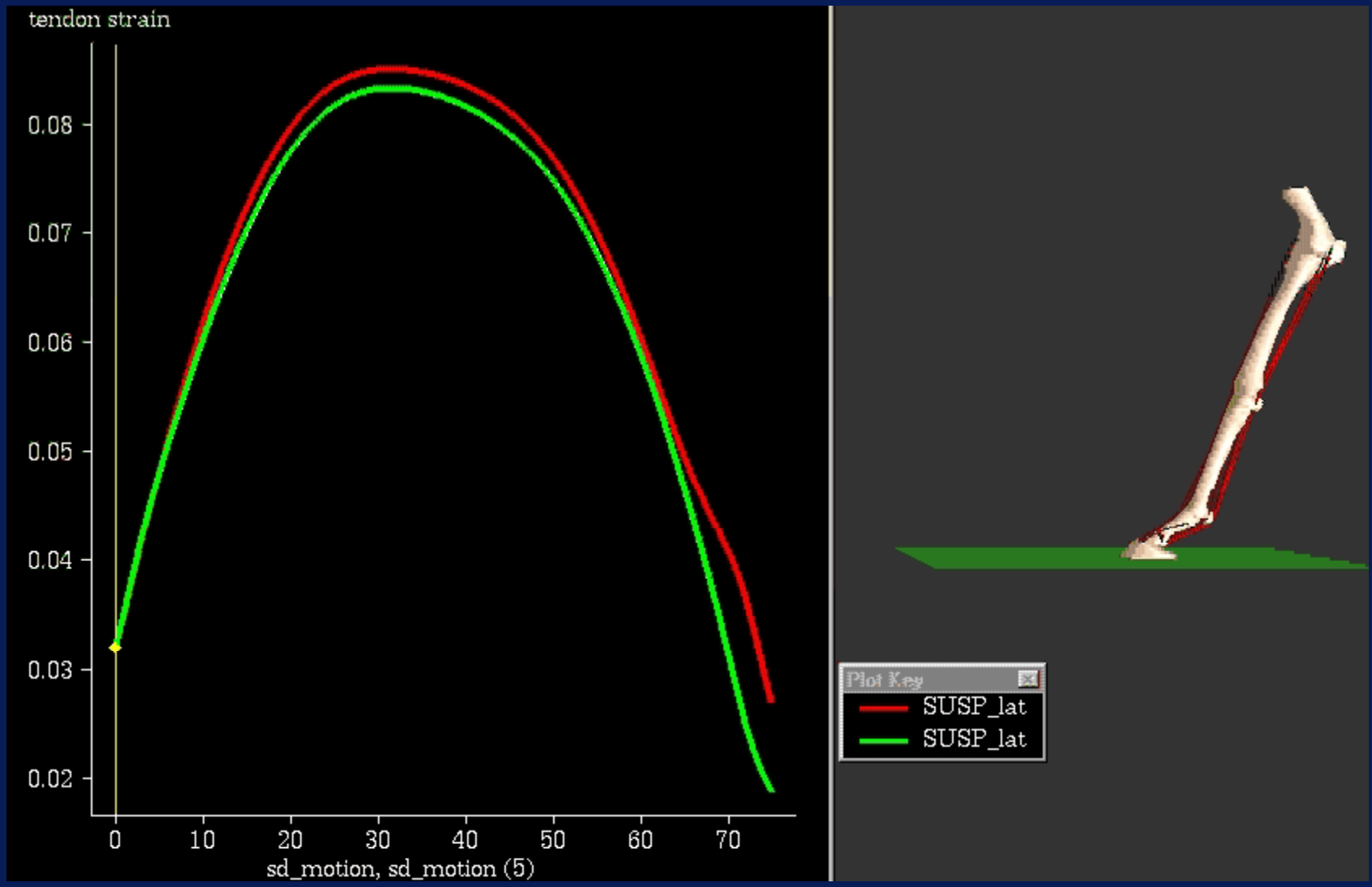
Influence of Soft Track

- k: $1.84 \cdot 10^9$ → $6.98 \cdot 10^7$
- b: 69500 → 32500



Pratt (1984)

Compliant Surface: ε_{Susp}



Future Research Goals (cont)

- Computer modeling of exercise histories to determine training regimes with low risk for injury


Graduate Students
Ian Campbell
Al Kane
Leah Estberg
Tracy Carrier
Val Gibson
Luke Hiller
Lanny Griffin
Ashley Hill
Diane Gross
Craig Malik
Jacob Setterbo
Rachel Entwistle
Veterinary Students
Jennifer Reese
Jessica Wade
Collaborators
Bruce Martin
Jeff Gibeling
Mont Hubbard
Dave Hawkins
Scott Hazelwood
Maury Hull
Tara Johnson
Alex Ardans
Tanya Garcia
Shrinivasa Upadhyaya

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Niarchos Foundation

GRAYSON-JOCKEY CLUB RESEARCH FOUNDATION

USDA

J.D. Wheat Veterinary Orthopedic Research Laboratory

UC DAVIS School of Veterinary Medicine

CHRB Postmortem Program