

# The Detrimental Effects of Toe Grabs

## Thoroughbred Racehorses at Risk

Presented by Bill Casner  
Prepared by Mitch Taylor  
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# The Problem



# Thoroughbred Race Horse Anatomy

- Age
  - Bone structure is not completely matured in 2-5 year-olds
  - Hoof is not completely matured
- Pastern Length
  - Long pasterns tend to facilitate underslung heels
  - Underslung heels are correlated to decreased arterial blood perfusion which effects growth rates of the heels
- Hoof Type
  - Thin walls and soles, lack of cartilage mass, weak heels

Source: 2003. *Contrasting structural morphologies of 'good' and 'bad' footed horses*. Bowker, R.M. Proceedings 49th AAEP Convention, New Orleans, Louisiana

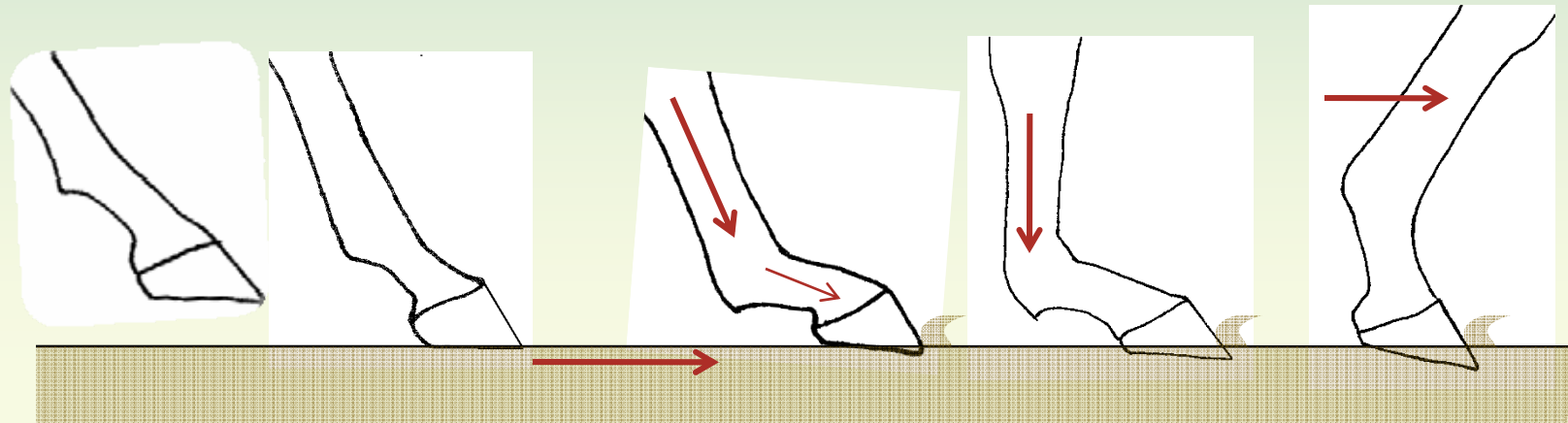
# The Mechanics of Toe Grabs

*How do shoes with toe grabs effect the leg and foot function?*

- When running, they act like a snowplow in the cushion which decreases the normal slide phase of the stride, driving the toe deeper into the track. This unnatural foot position results in a greater degree of fetlock dorsiflexion and coffin joint flexion which causes more strain on the suspensory apparatus structures of the leg.
- When standing, they result in a broken-back hoof pastern axis which facilitates under run heels.
- Clipping heels have catastrophic results



# Phases of the stride: *normal and with toe grab*



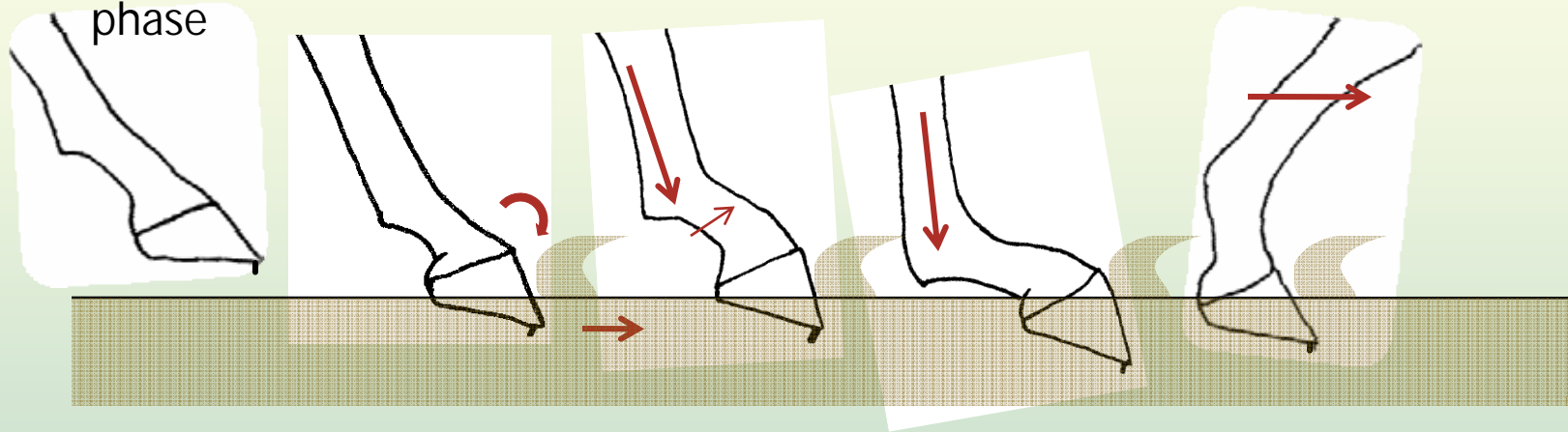
Retraction  
phase

Foot impact

Slide phase

Midstance

Breakover



\* Drawings recreated from slow motion photographs

# Studies conducted at top research centers show that toe grabs increase the risk of injury

## Sources:

*2007, Risk factors for proximal sesamoid bone fractures associated with exercise history and horseshoe characteristics in thoroughbred racehorses. Hill, A., Stover, S., et. Al, AJVR, vol 68.*

*2004, Effects of injury to the suspensory apparatus exercise and horseshoe characteristics on the risk of lateral condylar fracture and suspensory apparatus failure in forelimbs of thoroughbred racehorses. Hill, A. et. al, AJVR, vol 65.*

*2004, Evaluation of forelimb horseshoe characteristics of thoroughbreds racing on dirt surfaces. Gross, D., Stover, S. et.al, AJVR, vol 66.*

*2001, Risk factors for and outcomes of non-catastrophic suspensory apparatus injury in thoroughbred racehorses. Hill, A., Stover, S., et. al, JAVMA, vol 218.*

*2001, Underrun heels and toe grab length as possible risk factors for catastrophic musculoskeletal injuries in Oklahoma racehorses. AAEP, vol 47*

*1996, Evaluation of horseshoe characteristics and high-speed exercise history as possible risk factors for catastrophic musculoskeletal injury in thoroughbred racehorses. Hernandez, J., et.al, AJVR, vol 66.*

*1996, Postmortem evaluation of homotypic variation in shoe characteristics of 201 thoroughbred racehorses. Kane, A., Stover, S., et. al, AJVR, vol 57.*

*1994, Causes of death in racehorses over a 2 year period. Johnson, B. J. et al., Equine Vet. J., vol 26.*

*1994, Epidemiologic studies of racehorse injuries. Kobluk, C.N., Current Techniques in Equine Surgery and Lameness, 2nd ed., Eds: N.A. White and J.M. Moore, W.B Saunders Co. pp 564-569.*

# Documented Research Results

- Catastrophic injuries
  - Toe grabs were present on **90.5%** of horses
  - Greater risk of catastrophic injury for long toe, underslung foot types
- Suspensory apparatus injuries
  - 15.6% greater chance of suspensory apparatus failure with toe grabs than without

Sources in order of use: 1996. *Postmortem evaluation of homotypic variation in shoe characteristics of 201 Thoroughbred racehorses.* Kane, A.J. et al. *AJVR*.57: 1141-1146.; 2001. *Underrun heels and toe-grab length as possible risk factors for catastrophic musculoskeletal injuries in Oklahoma race horses.* Balch, Olin k. et al. vol.47, *AAEP proceedings*; 2001. *Risk factors for and outcomes of non-catastrophic suspensory apparatus injury in Thoroughbred racehorses.* Hill AE, Stover GM, et al. *JAVMA*. 218: 1136-1144; 1996. *Horsehoe characteristics as possible risk factors for fatal musculoskeletal injury of Thoroughbred racehorses.* Kane, A.J. et al. *AJVR*. 57:1147-1152

## Documented Research Results (continued)

- Harder racetrack surfaces are associated with increased risk for fatal injuries
- **\$1 billion economic impact** of musculoskeletal injuries in the Thoroughbred racehorses
- Up to **83%** of Thoroughbred racehorse deaths can be contributed to an exercise-related injury

Sources in order of use: 2001. *Racehorse injuries, clinical problems and fatalities recorded on British racecourses from flat racing and National Hunt racing during 1996, 1997 and 1998.* Williams, R.B. et al. *Equine vet J.* 33, 478-486; 1998. *Epidemiologic studies of racehorse injuries.* Kobluk, C.N. *Current Techniques in Equine Surgery and Lameness*, 2nd edn., Eds: N.A. White and J.M. Moore, W.B Saunders Co. pp 564-569; 1994. *Causes of death in racehorses over a 2 year period.* Johnson, B. J. et al. *Equine vet. J.* 26, 327-330



# The odds of injury increase with height of toe grab

	<u>Low Toes (4mm)</u>	<u>Reg toes (6mm)</u>
<b><i>Fatal musculoskeletal injuries</i></b>	<b>1.8 x</b>	<b>3.5 x</b>
<b><i>Suspensory apparatus failure</i></b>	<b>6.5 x</b>	<b>15.6 x</b>
<b><i>Cannon bone condylar fracture</i></b>	<b>7.0 x</b>	<b>17.1 x</b>

1996, Horseshoe characteristics as possible risk factors for fatal musculoskeletal injury of thoroughbred racehorses. Kane, A., Stover, S., et.al, AVJR, vol 57.

# The Effects of a Regular Toe Grab on hard surface

Toe grabs cause a broken back hoof pastern axis when standing on a hard surface



300 lbs

300 lbs

# The Effects of a Regular Toe Grab on hard surface

The elevation of the toe results in an unnatural and unhealthy loading of the bones of the digit when the horse is running



1200 lbs

1200 lbs

# The Effects of a Regular Toe Grab on hard surface

The toe grab results in an increased tension on the suspensory apparatus and more compression of the heels



3000 lbs

3000 lbs



# Flat shoe





# XT or 2mm wear plate



# Low toe (4mm)



# Regular toe (6mm)



# High Toe (8mm)



# The catastrophic result of clipping heels





# Clipping heels

Close up of toe grabs locking



# The Solution



- Eliminate the use of toe grabs on front feet
- Continue to fund quantifiable research in equine lameness
- Develop minimum required standards for farriers
- Develop a standardized training curricula for farriers

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