

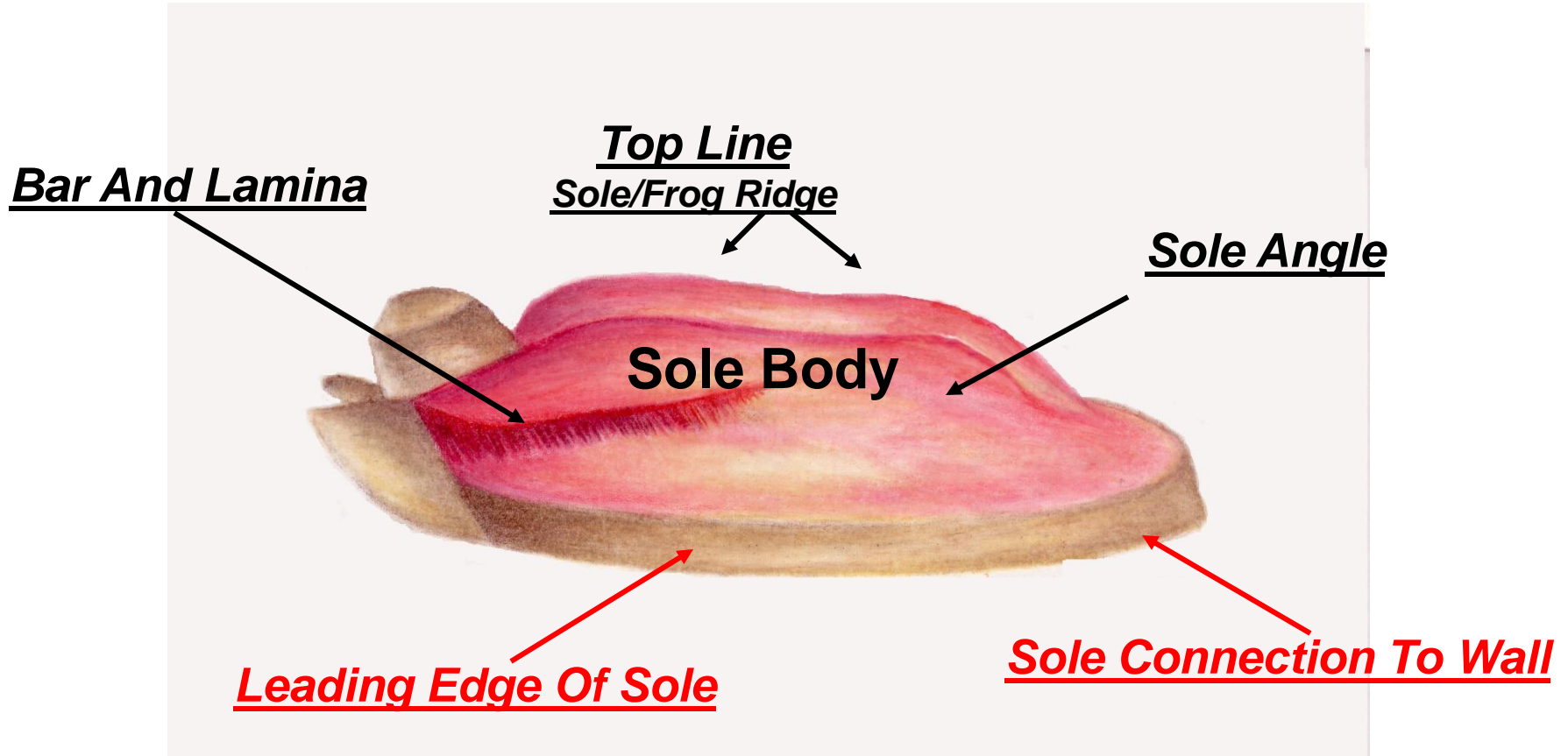
The Weight Bearing Function Of The Sole “Anatomical Evidence”

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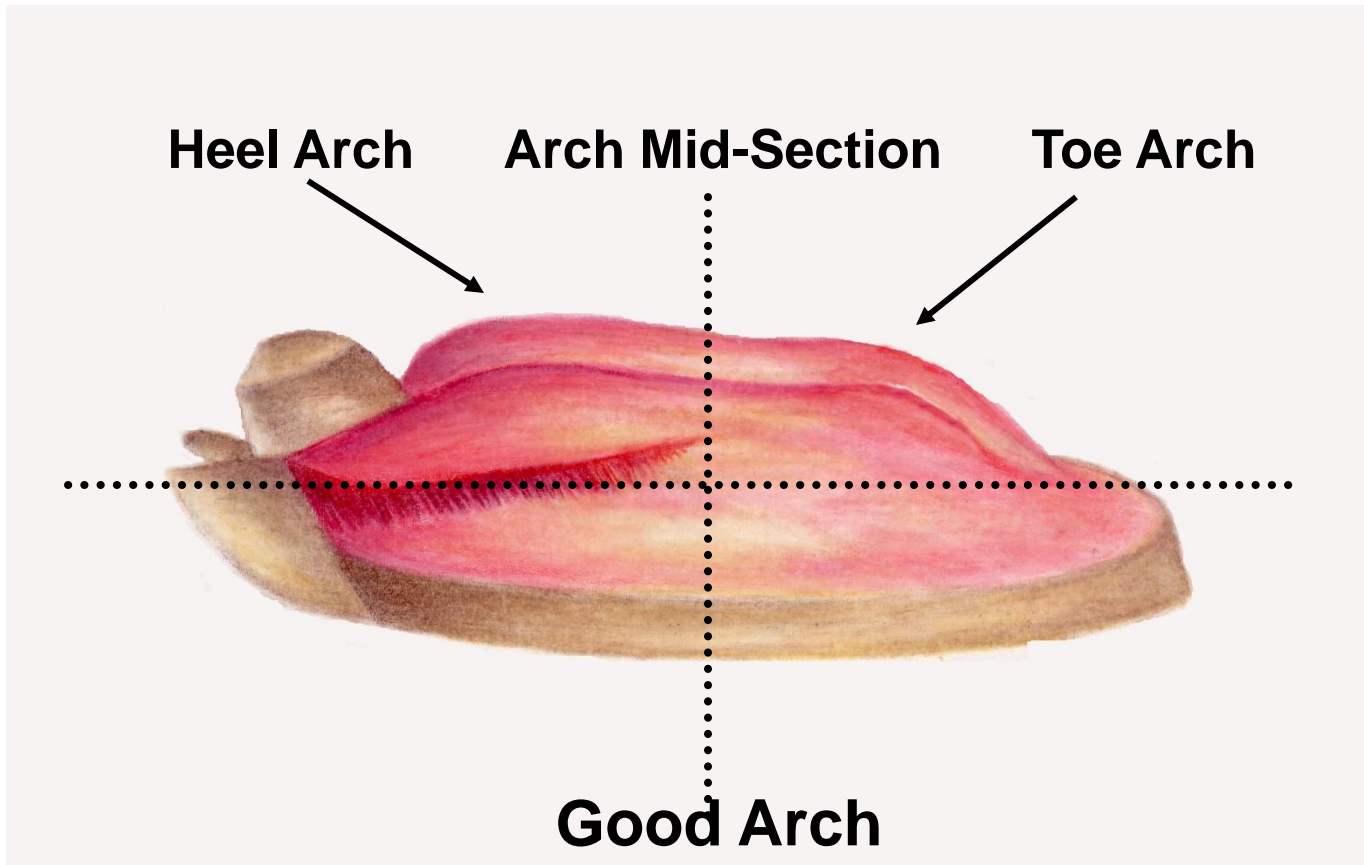
Bone Position

**Using the arch of the sole as a
means to identify the plane of
the PIII bone**

Sole



Arch Of The Foot



Good Arch

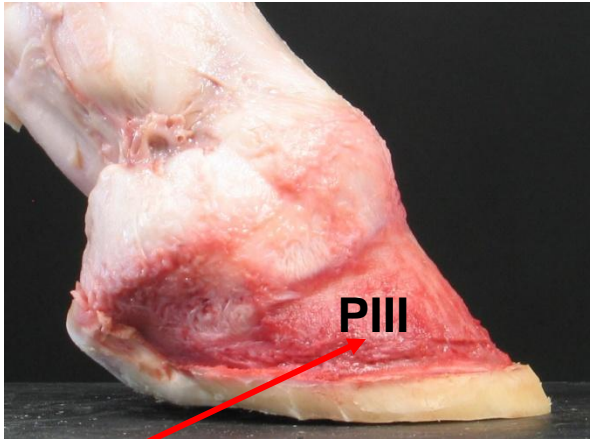
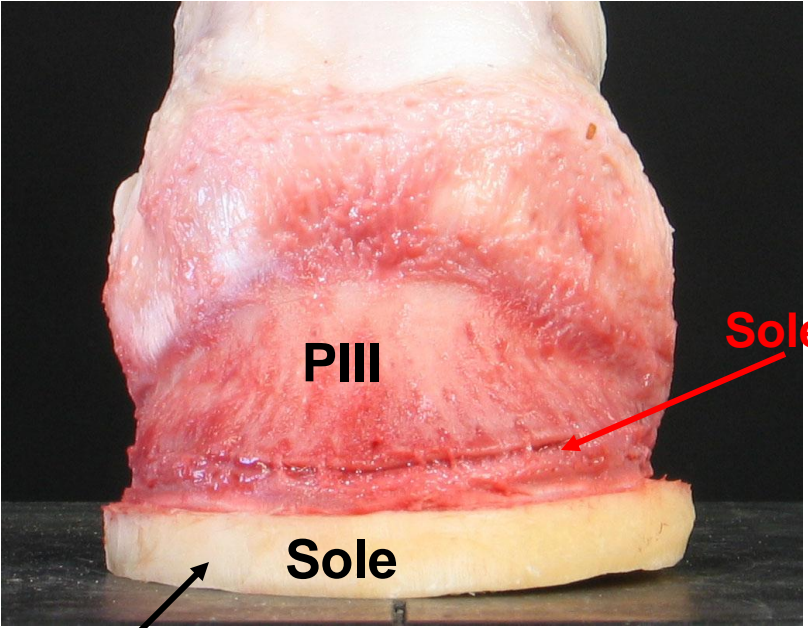


Strong & Well Developed Arch

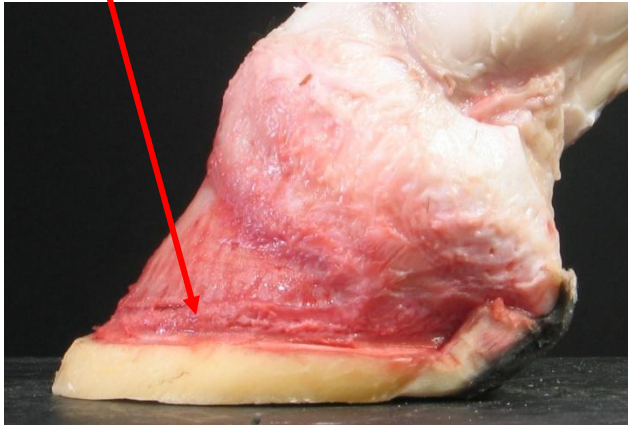


Arch Is Holding Bone Position

Bone Position Wall Removed



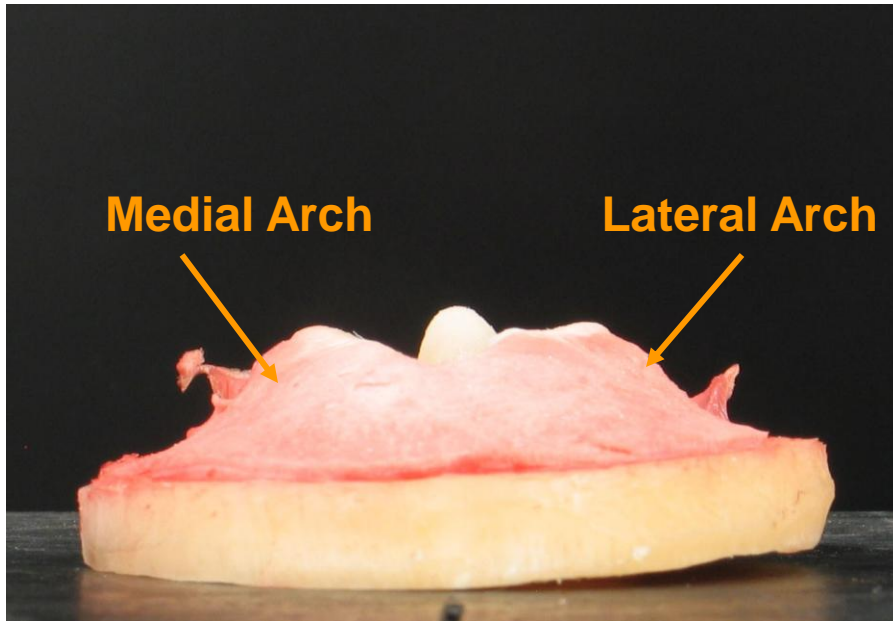
Medial



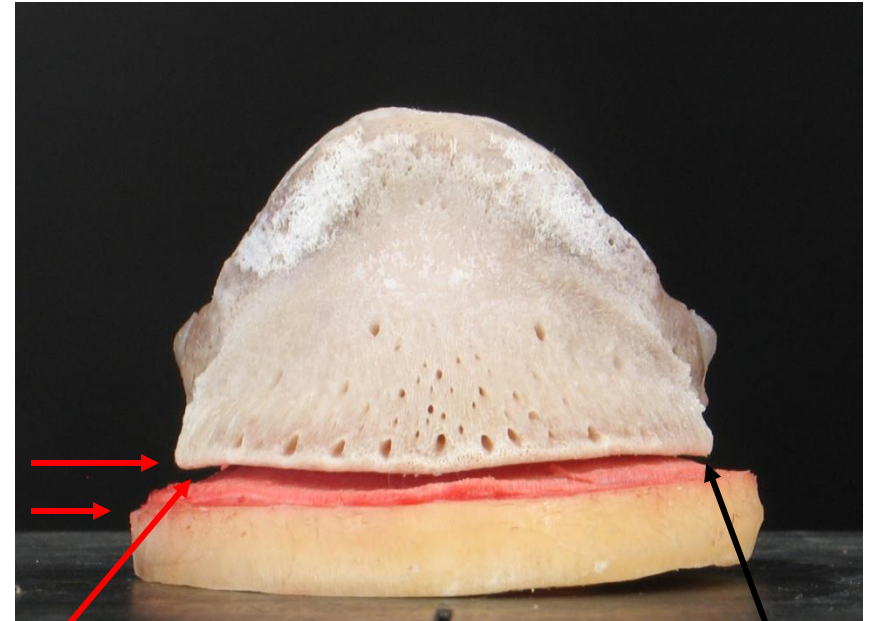
Lateral

Sole connection to wall

Good Arch



Arch of sole body



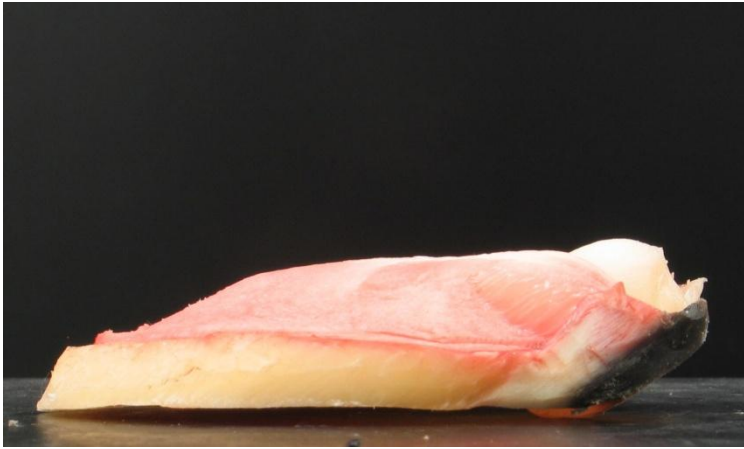
Bone position on arch

Space between bone and sole

Note: Leading edge of PIII is above sole connection to wall

Bone Position

Good Arch

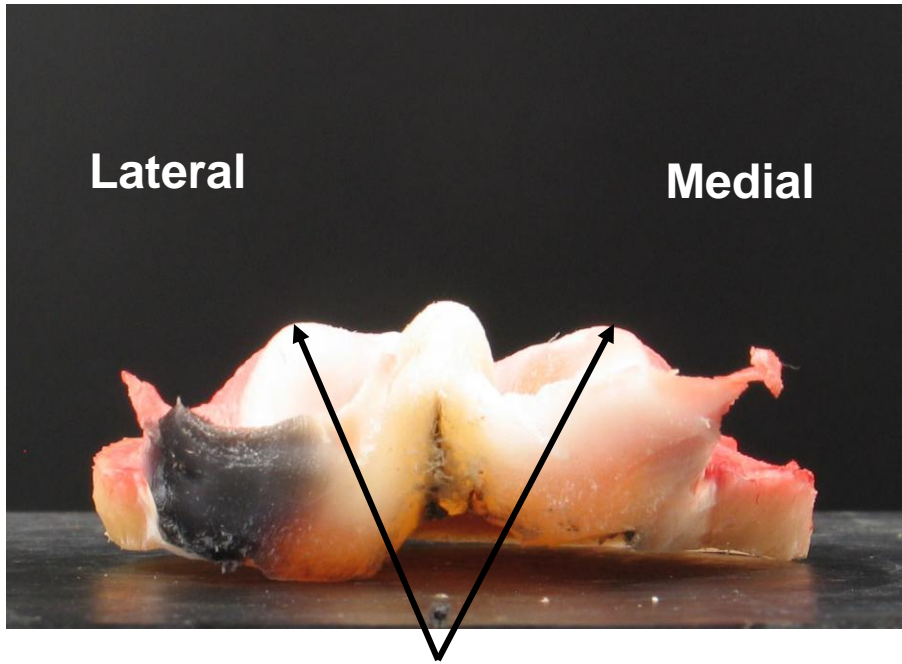


Lateral

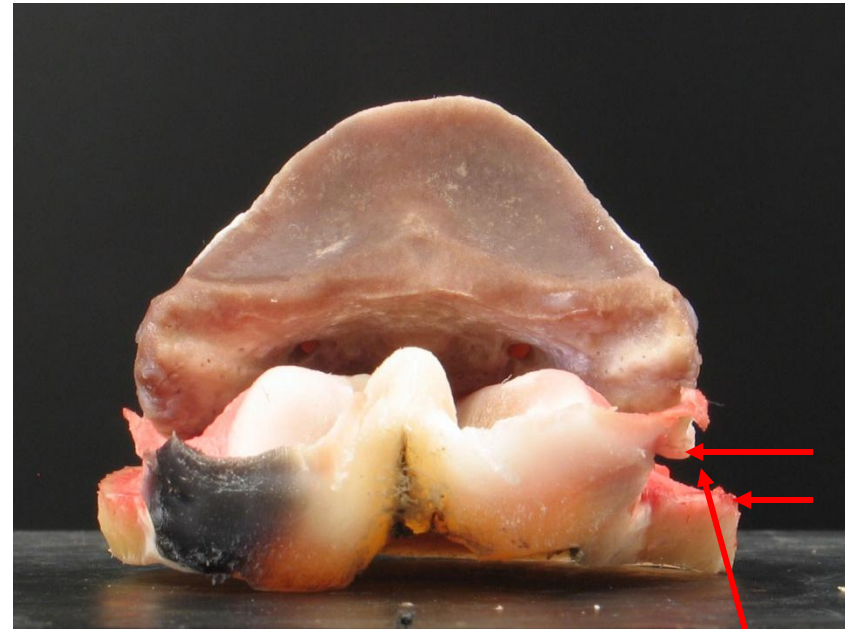
Medial

Space between bone and sole

Bone Position On Bar



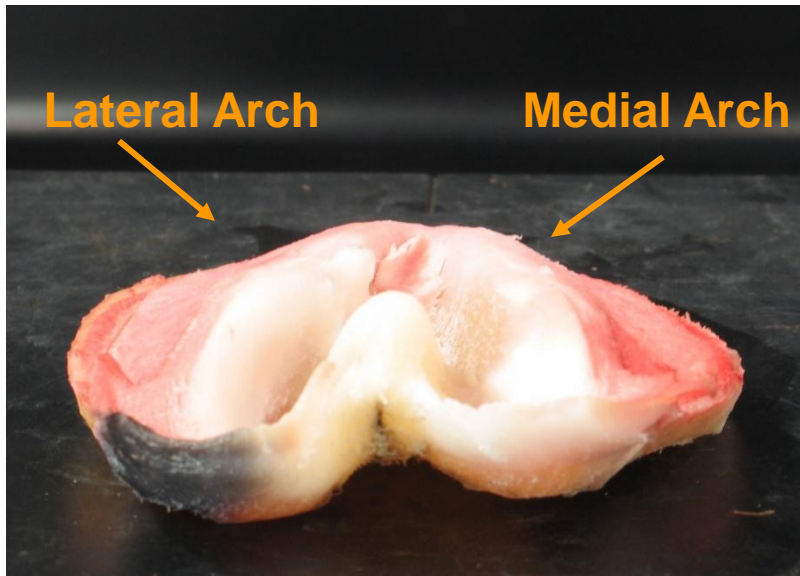
Top line of bars



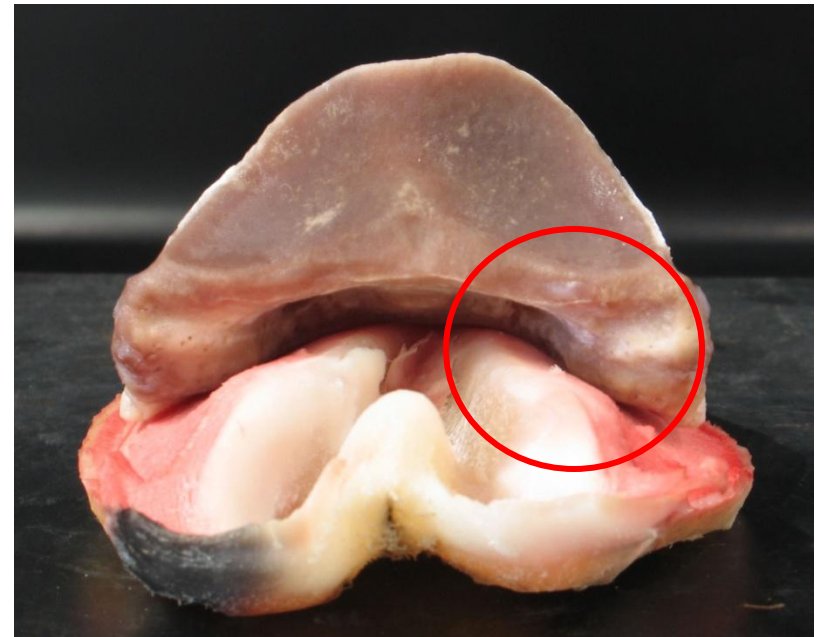
Bone position on bar

Space between bone and sole

Bone Models To The Arch



Arch



Bone position on arch

Bone modeling to arch

Bone Position

Bone centered on sole



Arch of sole body



**Good spacing between
bone and wall**

Bone Position



Good Arch



Bone Position On Arch



Weak Arch Toe Area

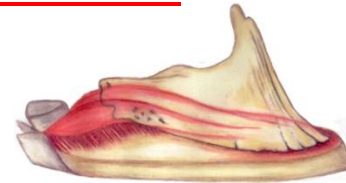


Weak Arch Mid-Section



Weak Arch Heel Area

P3 Bone
Negative Plane Toe Area



P3 Bone
Close Proximity
To Plane Of
Horizon



P3 Bone
Negative Plane Heel Area



Heel Arch



Good



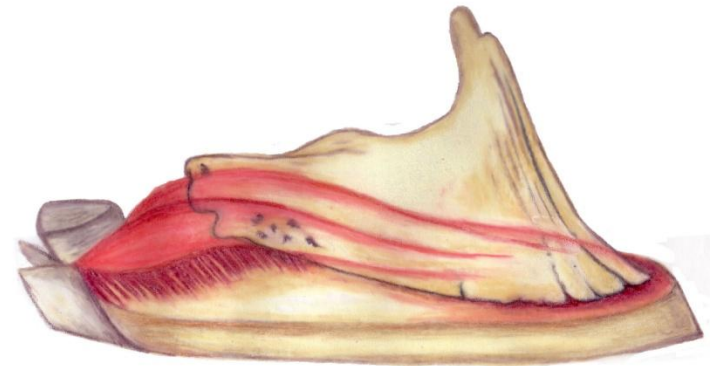
Bone Position

Arch →

Weak Toe Arch



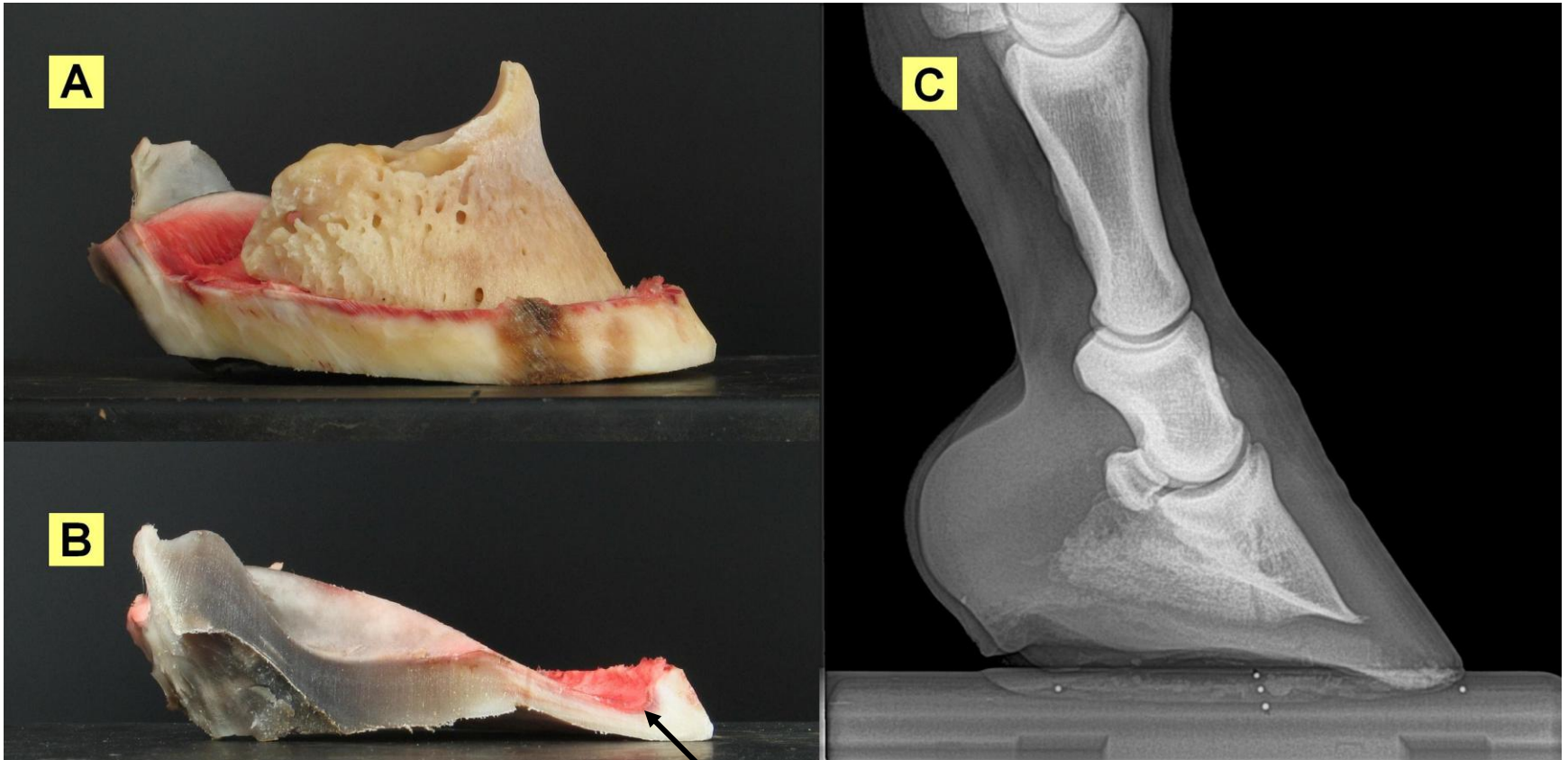
Strong Heel Arch



Toe Arch Flattening Not Supporting Bone Position

Angles Of The Sole Will Position PIII Bone In An Upright Angle

Larger Palmar Angle



High arch with sunk anterior (front) part of the sole. The radiograph in C is that of a live horse with similar conformation to the sole and pedal bone of A, B.

Movie PIII In Motion

Toe Area

Owner: Craig Animal: Research5b Date: 15-Jul-2006
RF Foot Lateral EponaTech Ranch



Toe sink

Owner: Craig Animal: Research5b Date: 15-Jul-2006
RF Foot Lateral EponaTech Ranch



No sole pack

Movie PIII In Motion

- **Movie 1 (No orthotic)**
- **Movie 2 (With orthotic)**



Two stage silicone putty

Owner: Craig Animal: Research5c Date: 15-Jul-2006
RF Foot Lateral EponaTech Ranch



Owner: Craig Animal: Research5c Date: 15-Jul-2006
RF Foot Lateral EponaTech Ranch



With sole pack

Stabilizing Movement Of PIII



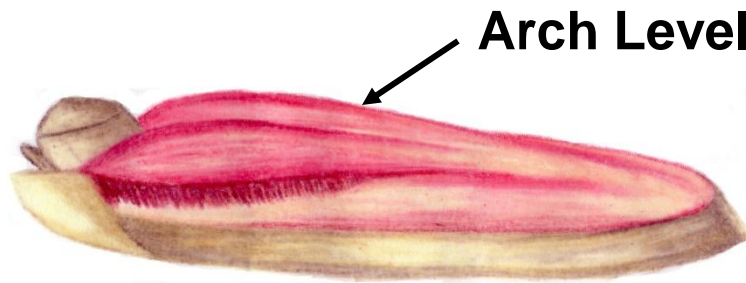
Arch Collapsing



Good



Bone Position



Arch Leveling



Wide Flat Foot Developing With Weak Arch

PIII Bone Will Be In Close Proximity To Plane Of Horizon

It has sole depth, it doesn't have an arch.

Pathology to the mid section to the bars, crushed heels, dropped soles along the leading edge of the leading edge of the p3 bone

Flat Footed



Flat sole. The radiograph in C is that of a live horse with similar conformation to the sole and pedal bone of A, B.

Morph Flat Foot

- **Single radiograph taken before without orthotic (arch support) and after with orthotic.**
- **Foot trimmed to a horizontal plane excess sole not removed**
- **Both radiograph were then morphed together to show the effects of the orthotic**



Toe Arch

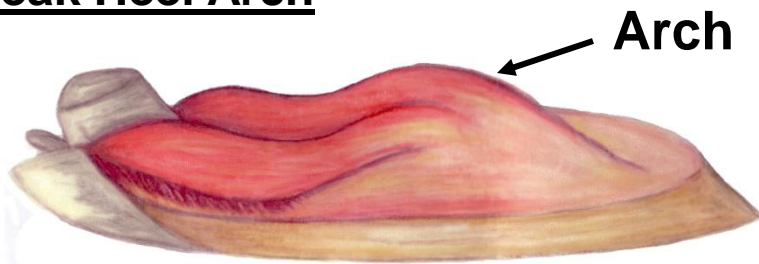


Good



Bone Position

Weak Heel Arch



Strong Toe Arch

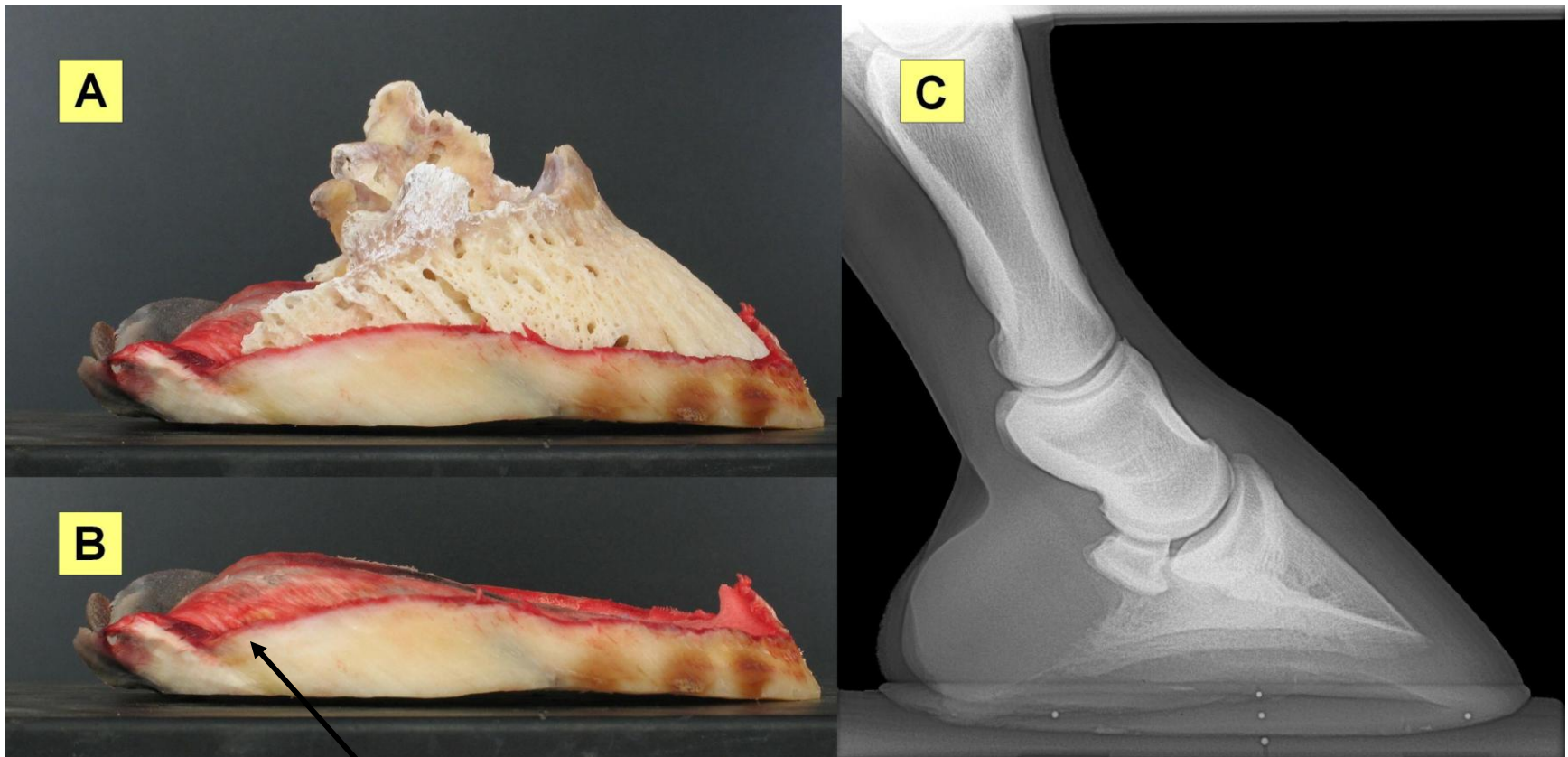


Heel Arch Flattening Not Supporting Bone Position

PIII Bone Will Develop A Negative Plane Heel Area

Negative Palmar Angle

*The bone position is in a negative plain.
More commonly seen in hind feet.*



Sole sunk in the caudal (back) area. The radiograph in C - is that of a live horse with similar sole and pedal bone conformation to that of A, B.



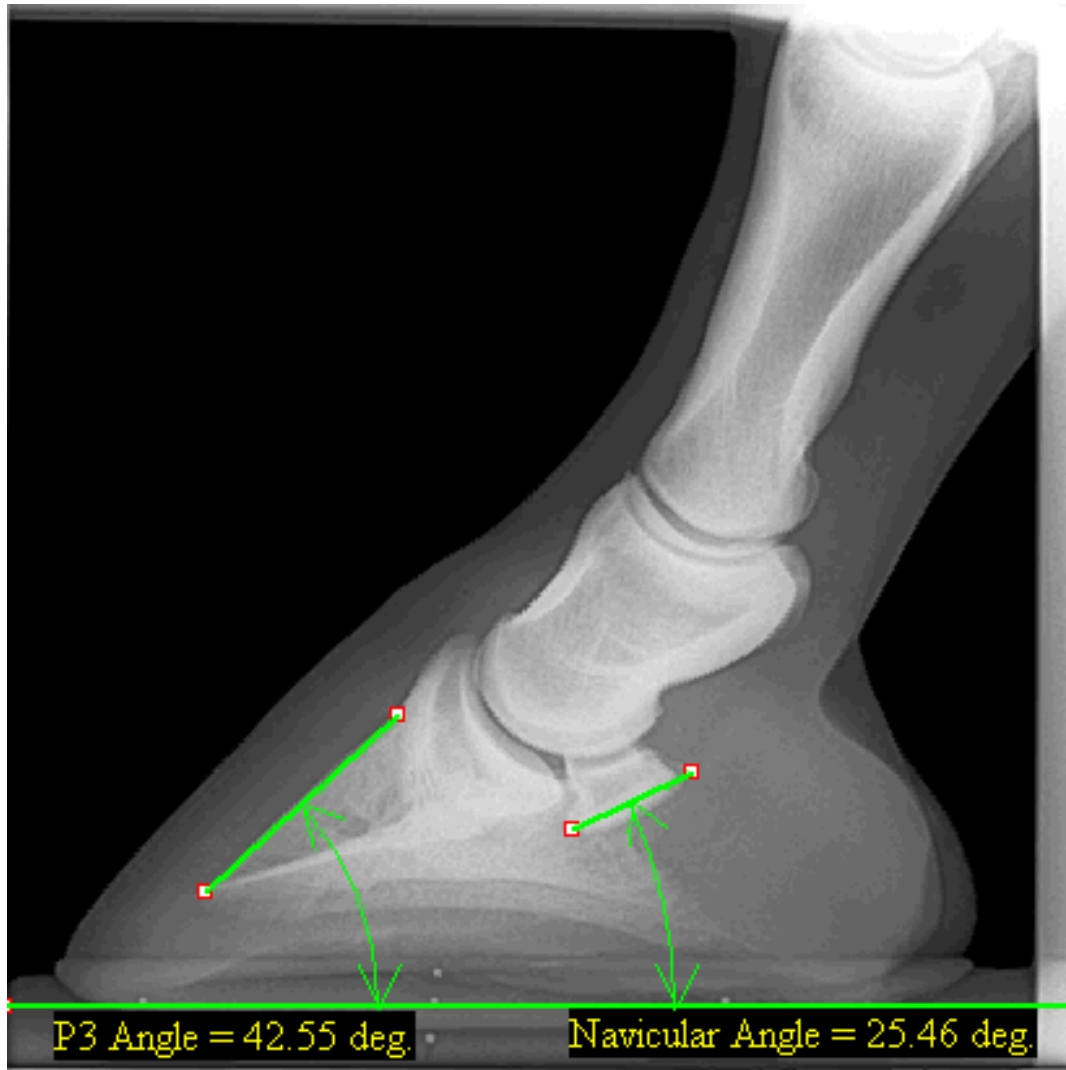
Toe lift

Movie PIII In Motion

Negative Plane Heel Area

Morph Negative Plane

- **Single radiograph taken before without orthotic (arch support) and after with orthotic.**
- **Foot trimmed to a horizontal plane excessive sole not removed**
- **Both radiograph were then morphed together to show the effects of the orthotic**



Negative plane

Pathology Based On the Plane Of The Pedal Bone (PIII)



Good Arch

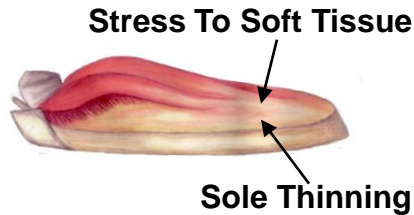


Bone Position On Arch

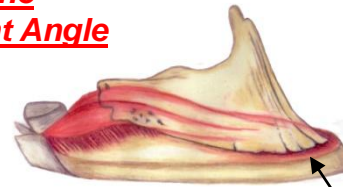


Normal Bone

Weak Arch Toe Area



PIII Bone Upright Angle

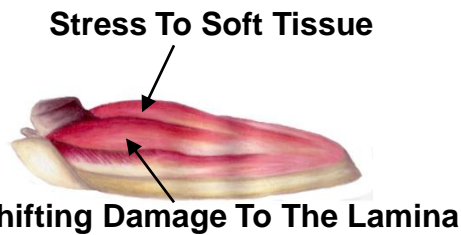


Flat Toe

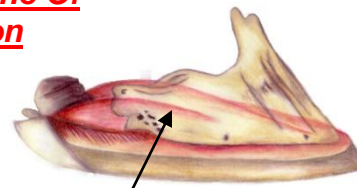


Bone Reabsorbing

Weak Arch Mid-Section



PIII Bone Close Proximity To Plane Of Horizon

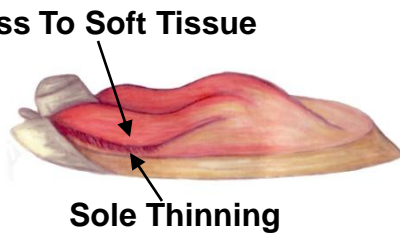


Flat Foot

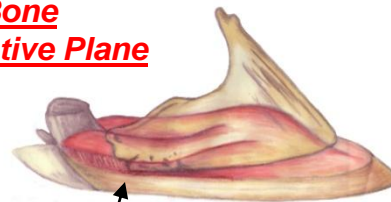


Stress Bump

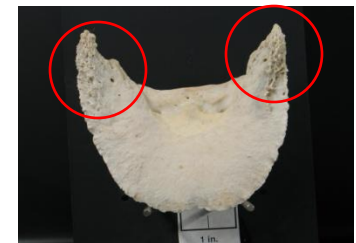
Weak Arch Heel Area



PIII Bone Negative Plane



Flat Heel



Bone Remodeling



Good bone position

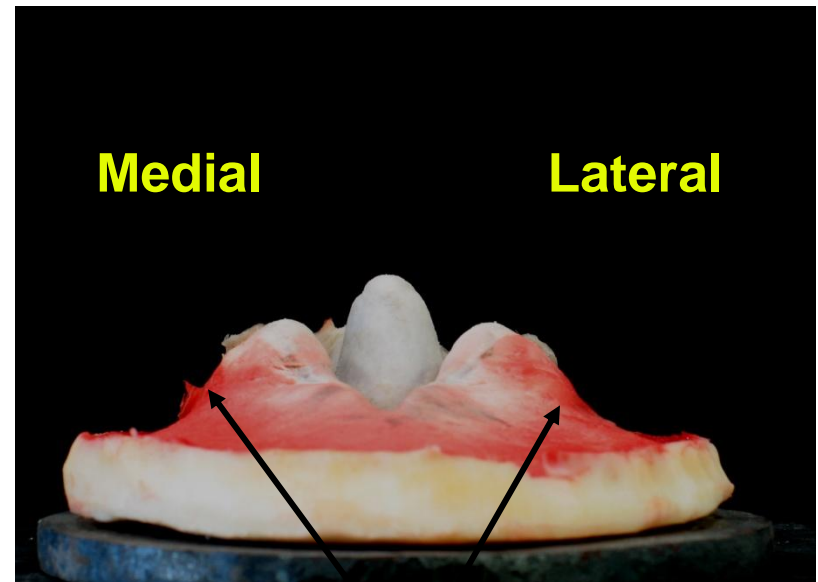
Bone Position

P111 and sole

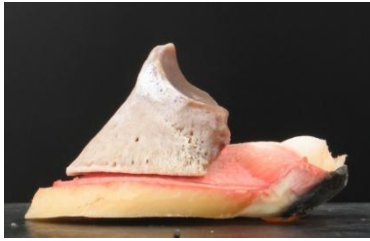
Sole body



Bone sinking into sole
P111 should be above the sole edge



Angle of sole body
Medial/Lateral arch



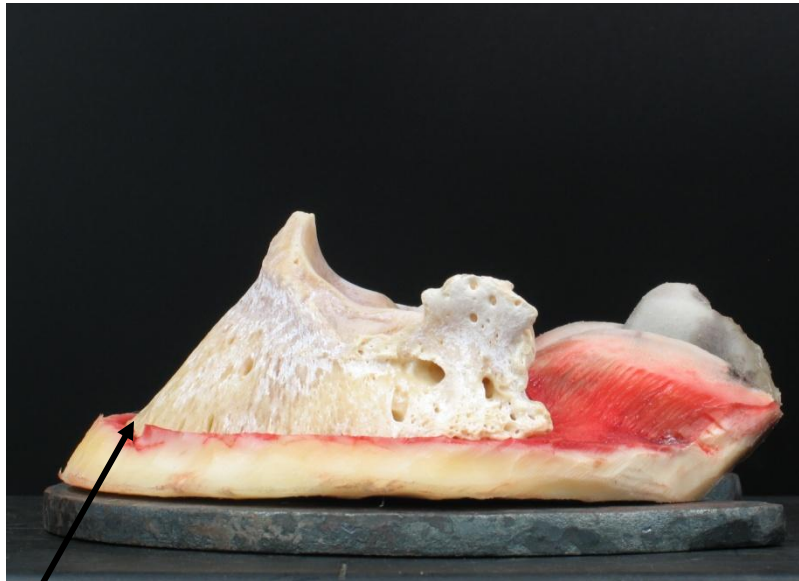
Good bone position

P111 and sole

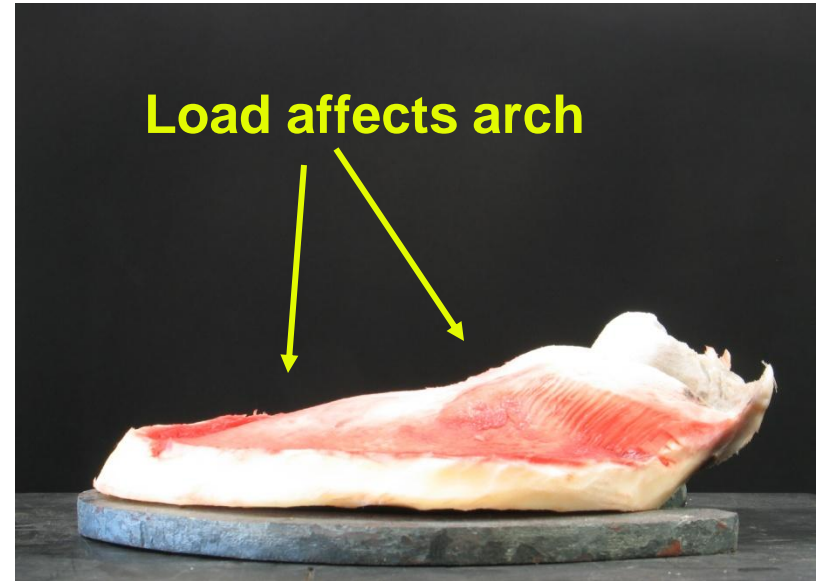
Bone Position



Good arch



Bone sinking into sole
P111 should be above the sole edge



Load affects arch

Angle of sole body

Bone Position

P111 below sole edge



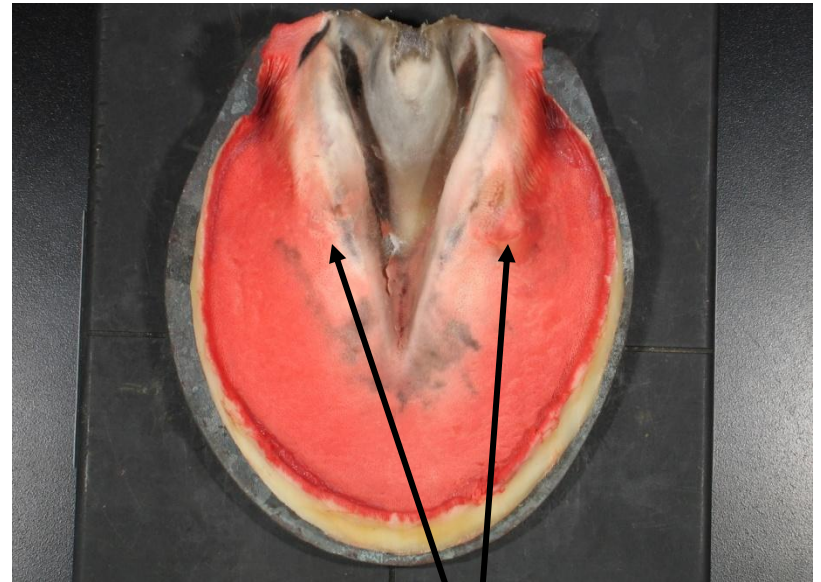
P111 sinking into sole

Bone Position

Damage to soft tissue caused by bone sinking into sole



PIII sinking into sole



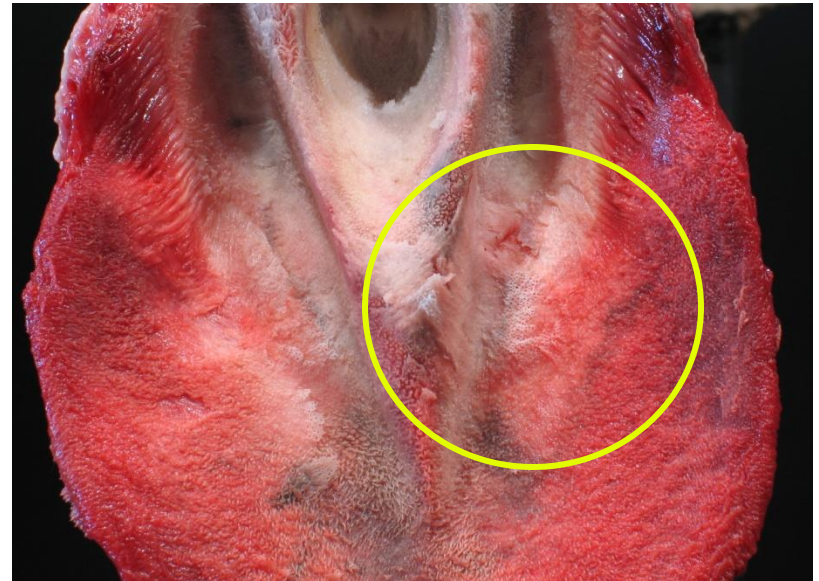
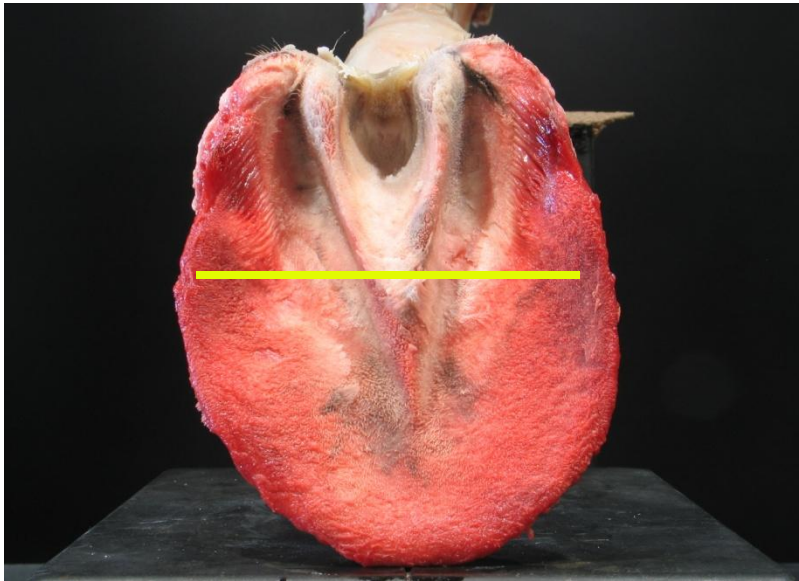
Weight bearing damage to the sole

Tissue Movement



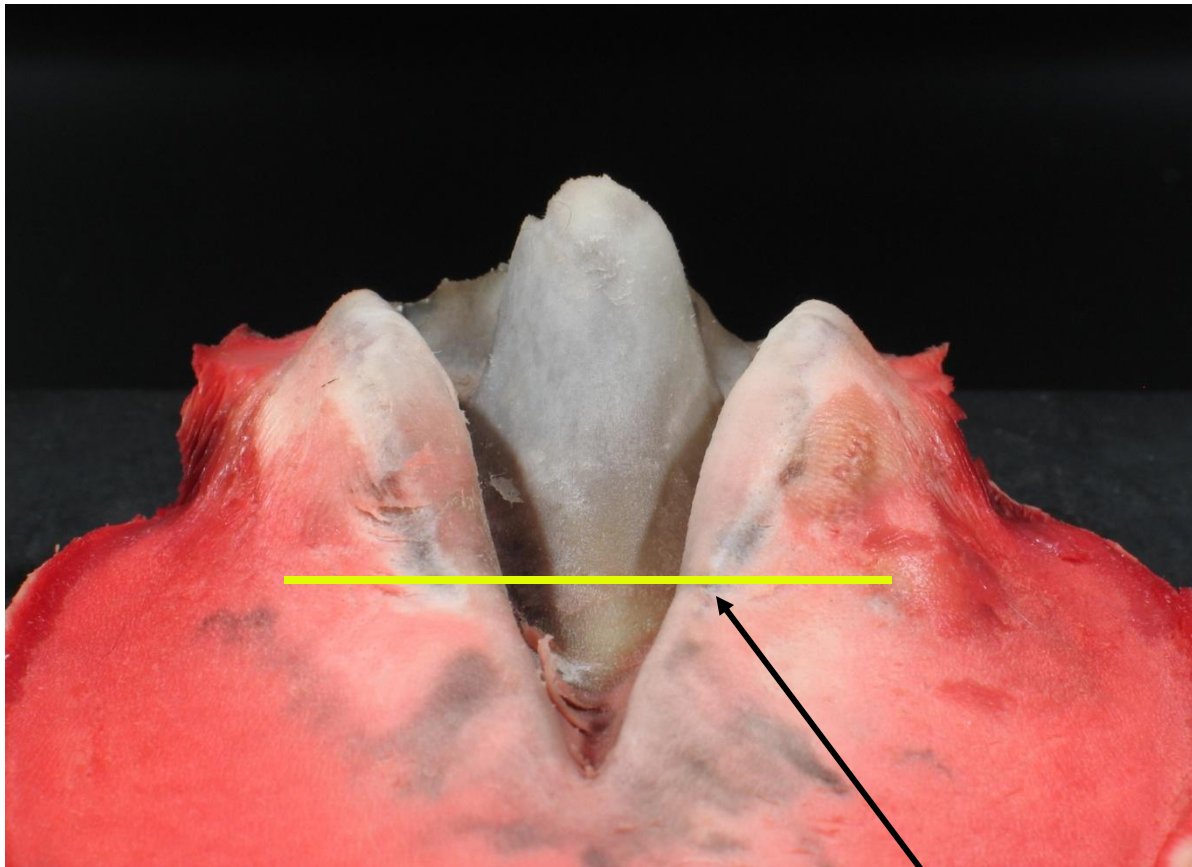
Close observation reveals a shift in tissue

Area Of Damage



Soft tissue damage

Effects Of Weight Bearing



A deviation in the frog sole connection

Collapsed Bar

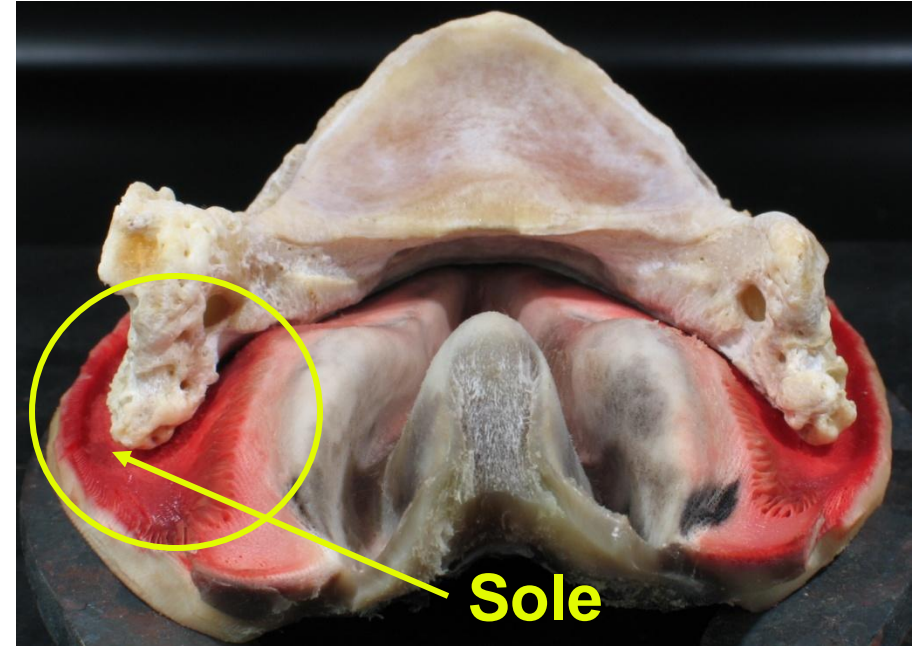
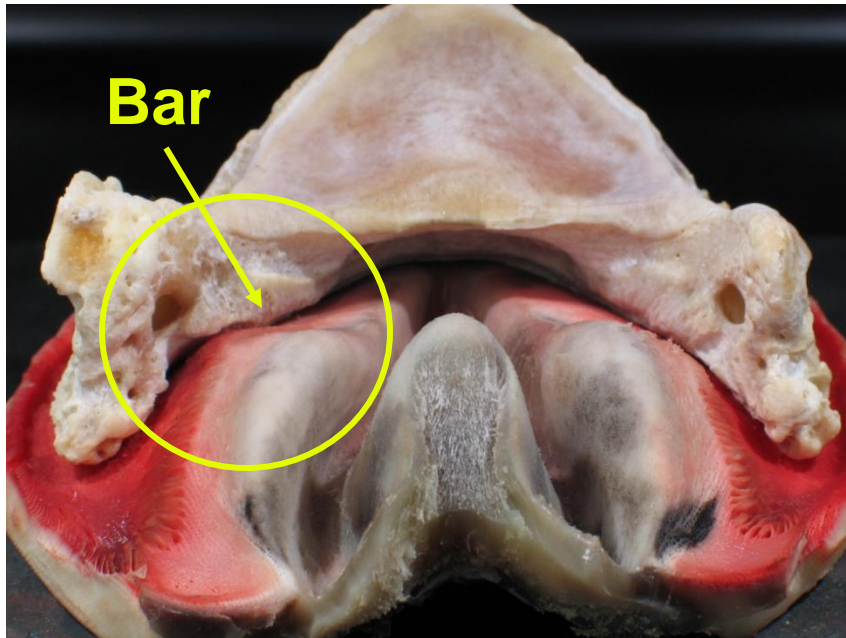


Medial



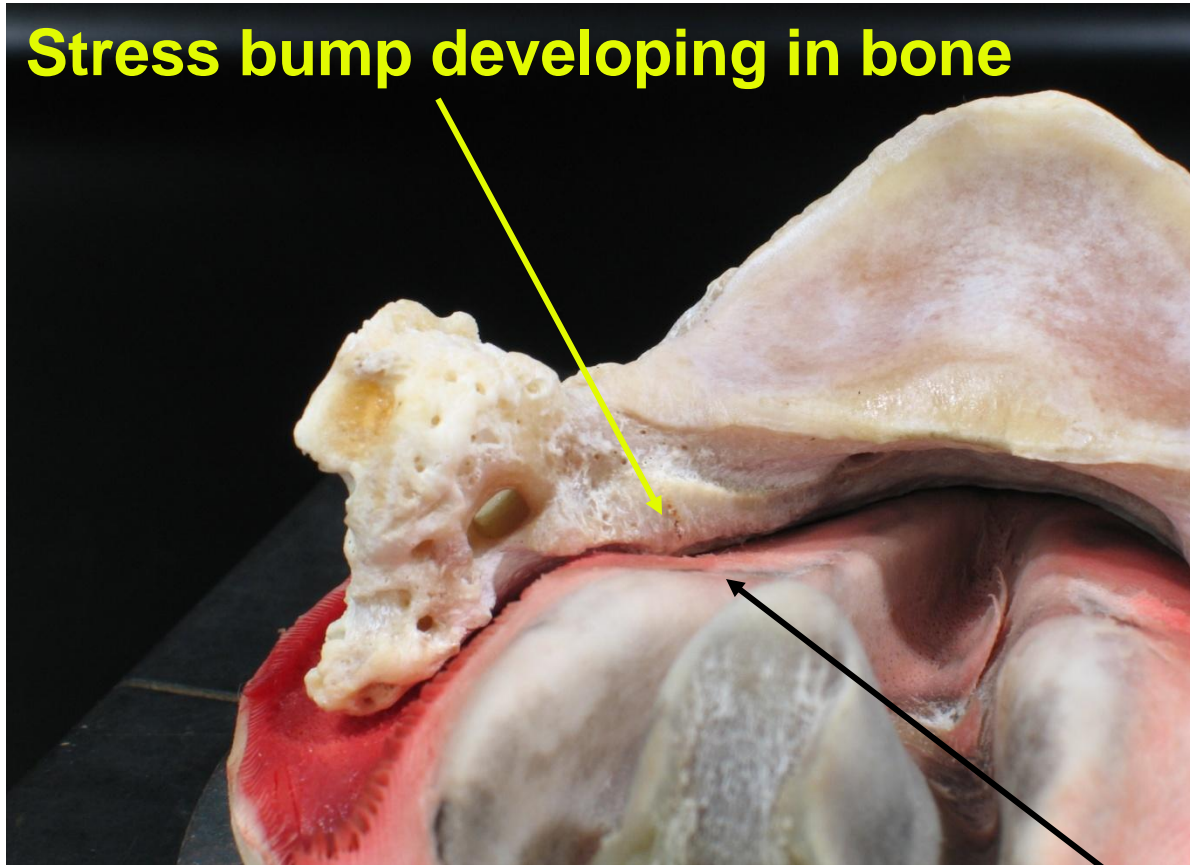
Lateral

Effects Of Body Weight



Bone position descending pressing into the bar and sole

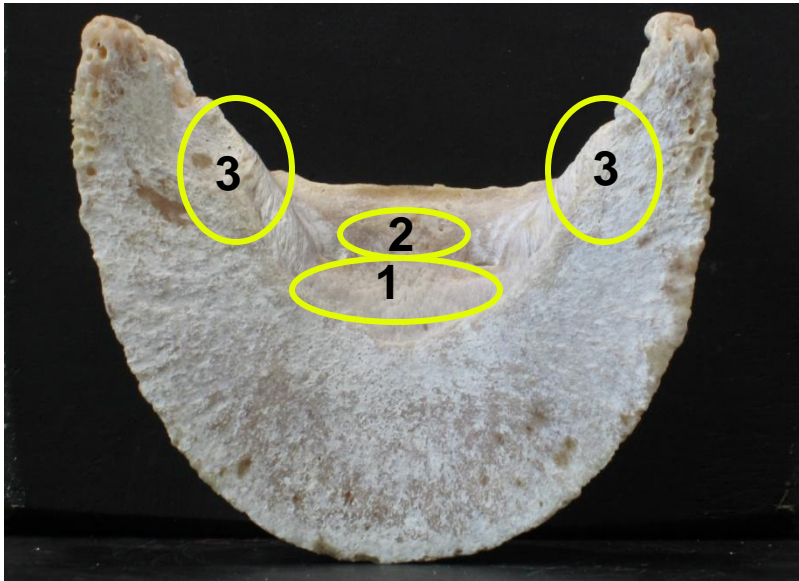
Bone Models To The Angles Of The Sole



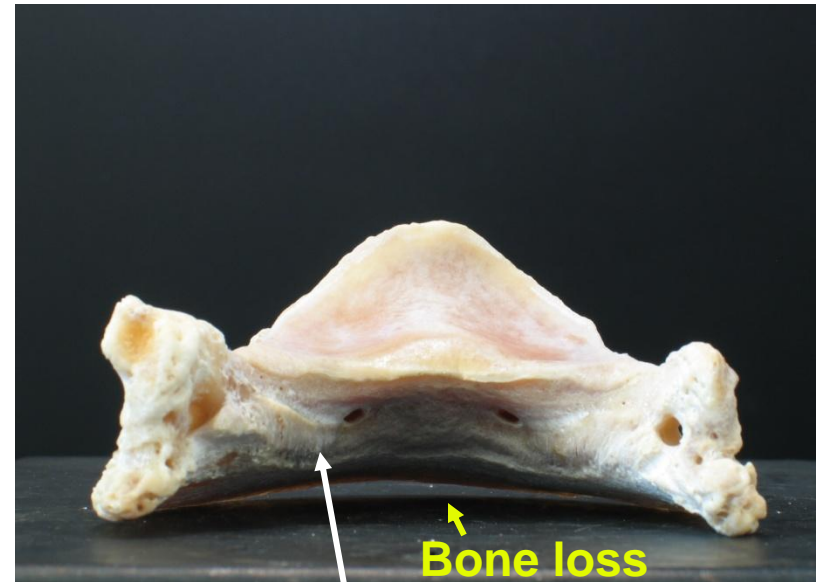
Stress bump developing in bone

Deviation in the sole

Bone Models To Pressure

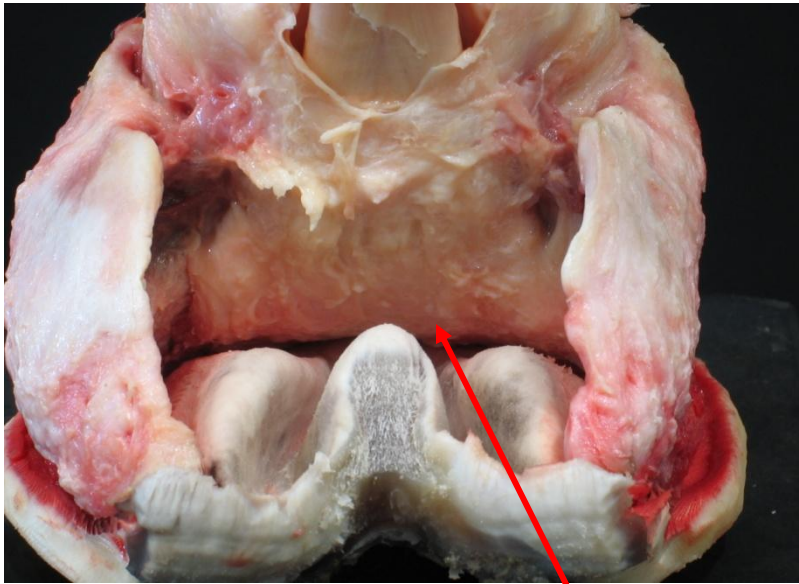


- 1) Stress bump DDFT
- 2) Stress bump Impar ligament
- 3) Stress bump Palmar Process

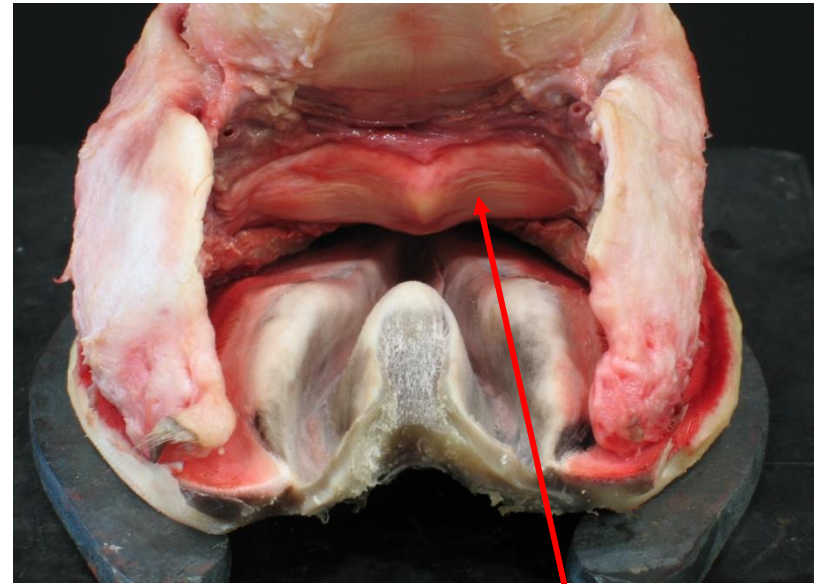


Stress bump Palmar Process

Internal Load



Deep digital flexor tendon (DDFT)



Navicular bone

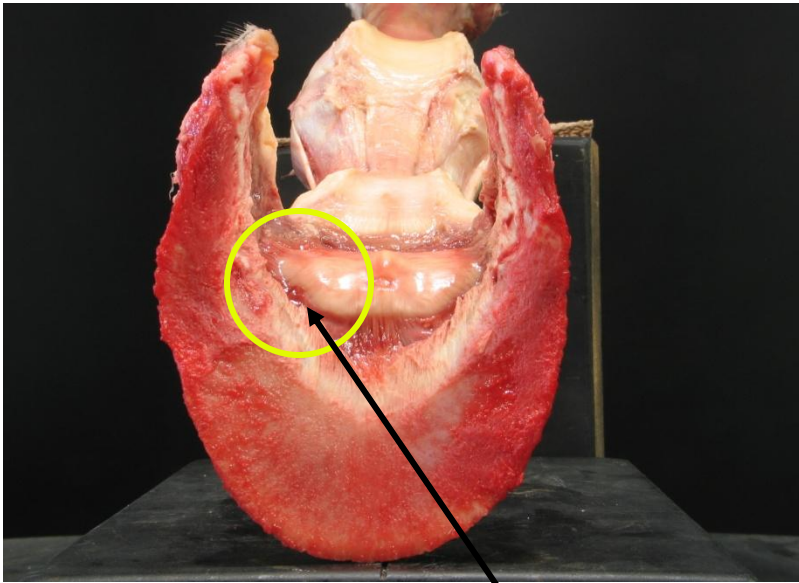
Motion Bar Movement

Load 5 & 6

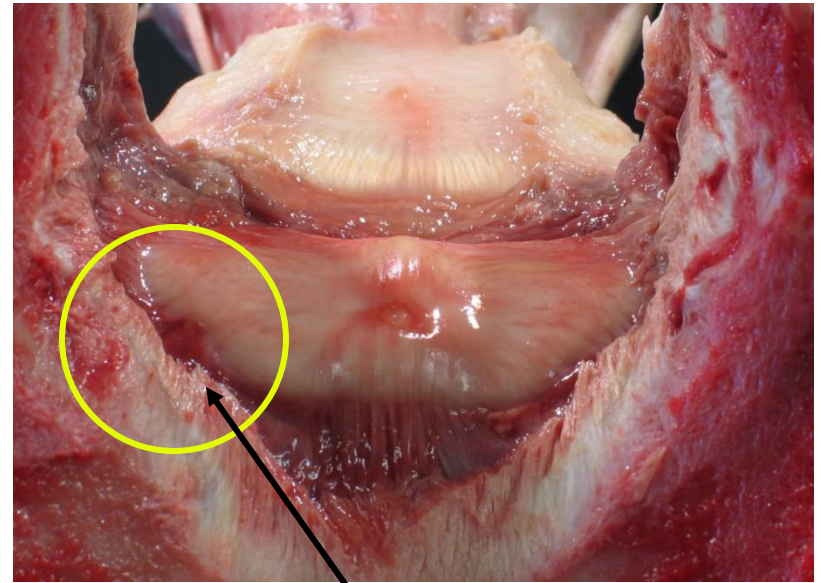




Pathology Navicular Bone

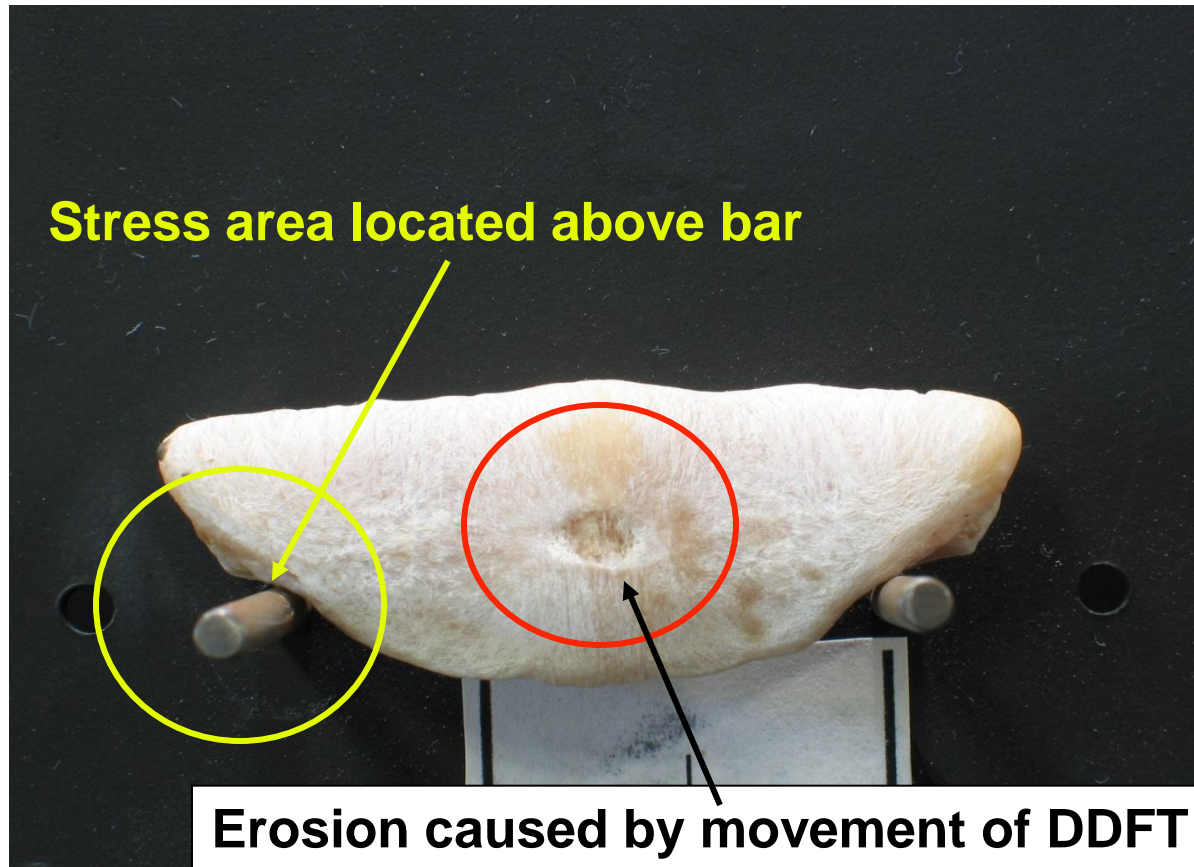


Stress caused by unequal loading



Stress area located above bar

Pathology Navicular Bone



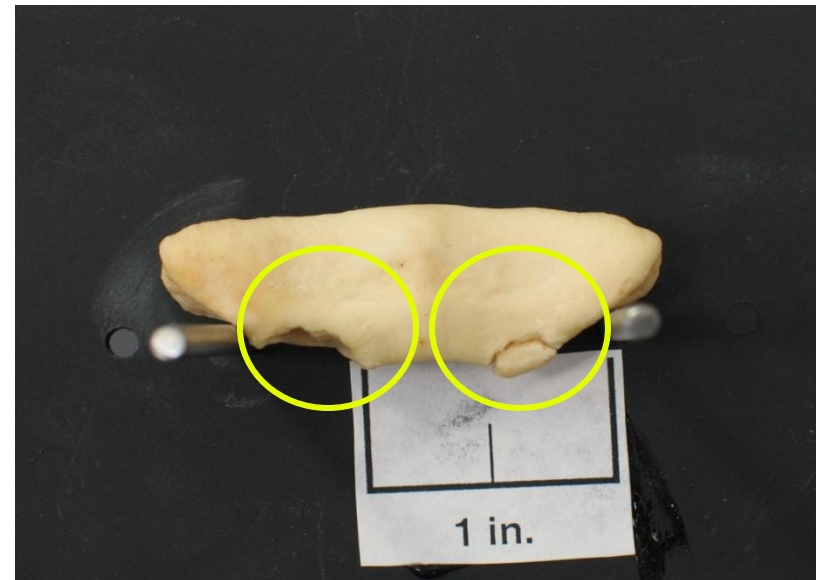
Pathology Navicular Bone

Weight bearing pressure on bone

Unilateral



Bilateral



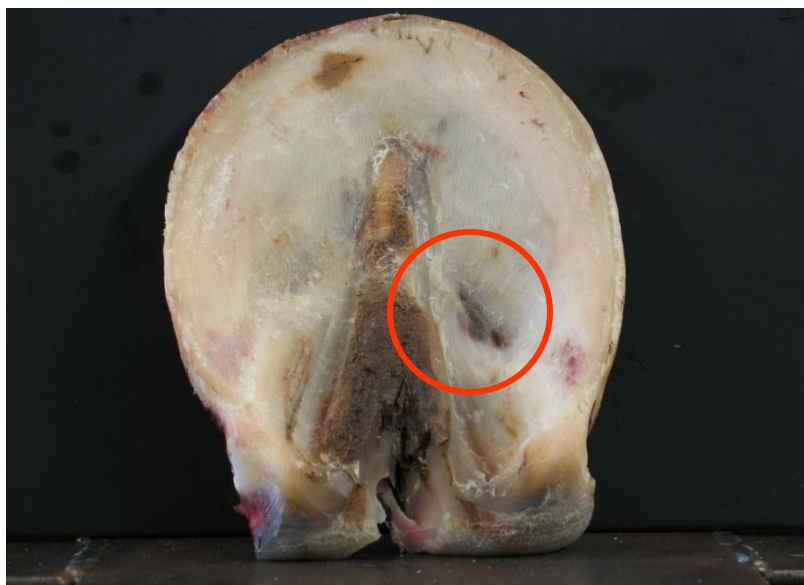
Location of stress above bar

Pathology To Sole

- **Bar/Sole abscess**
- **Crushing of the bar**
- **Damage to the soft tissue (dermas), lamina, bar, and sole**

Pathology To Sole

Trimming alone cannot prevent pathology to the sole
Bar shoe offers little support for sole body

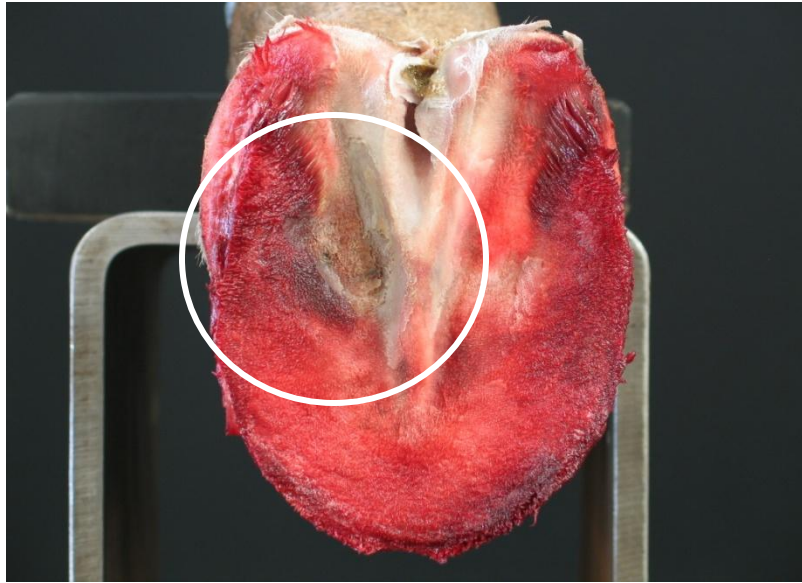


Bar/Sole abscess



Crushing of the bar

Pathology To Soft Tissue/Sole



Soft tissue



Bar, Lamina, Sole



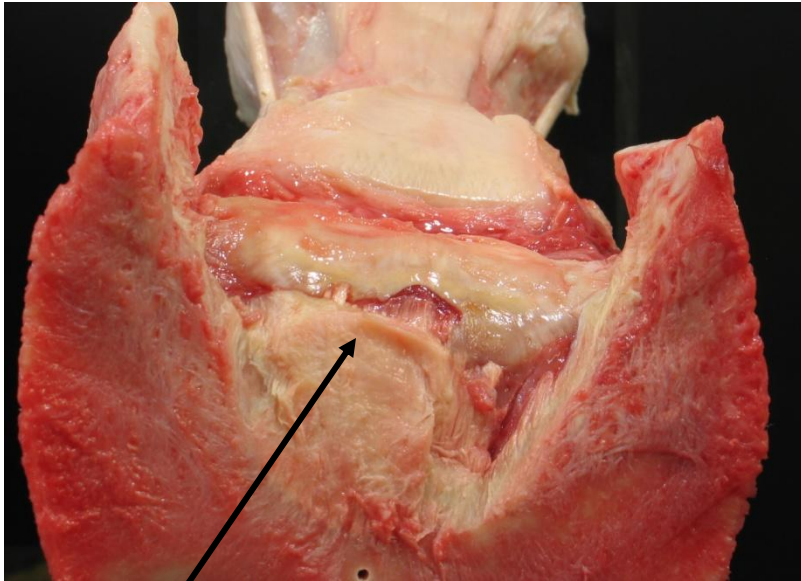
Bar, Lamina, Sole

DDFT Insertion To The Navicular Bone

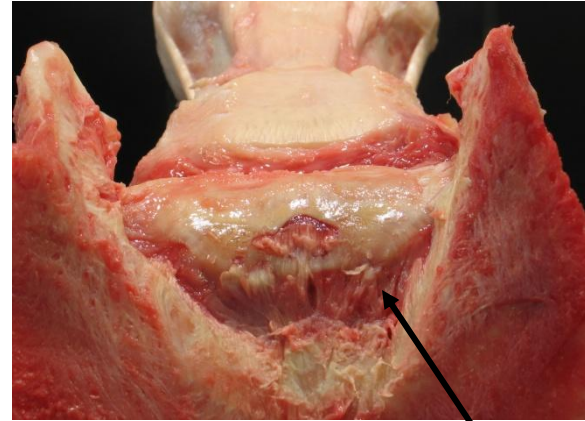


Severe damage to navicular bone

DDFT Insertion To The Navicular Bone



Deep Flexor Tendon (DDFT)

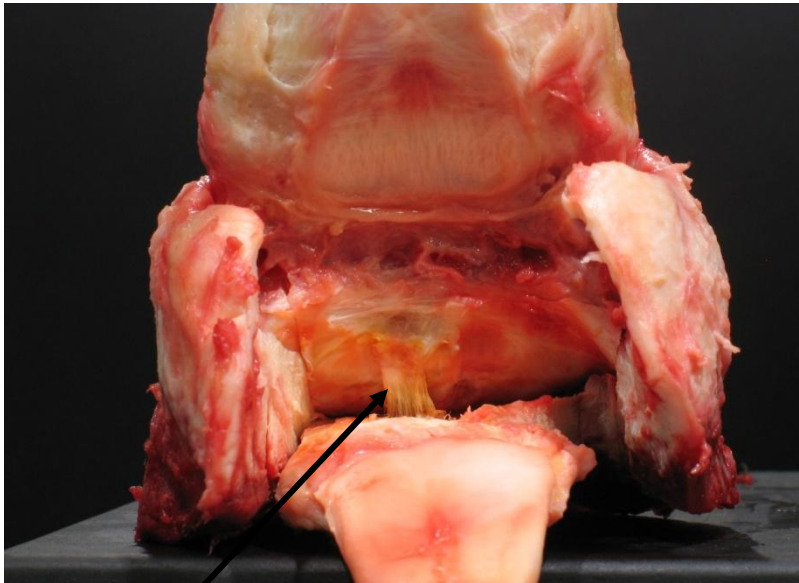


Impar ligament



Severe damage to navicular bone

DDFT Insertion To The Navicular Bone



Deep Flexor Tendon (DDFT)



Severe damage to navicular bone

Conclusion

- **Weight bearing affects on the sole quite often produce sore feet**
- **Because of its location the trauma to the mid-section is often referred to as navicular disease but in reality it is very often soft tissue damage**
- **Stabilizing bone movement as a preventive measure can reduce wear in this area**

Thank You

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Equine Research Center
Shandon CA. USA**