

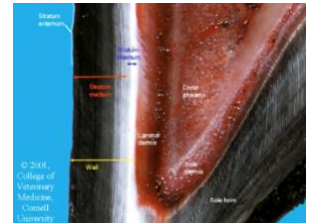
Biomechanics of Hoof Function:

- Hoof Strike Mechanics:

- **Heels strike the ground first**, with the **frog** acting as a wedge that pushes the bars apart.
- The frog compresses the **digital cushion**, spreading the cartilages of the hoof.
- **Flexion at the coffin joint** occurs as the phalanges bend, pushing up against the digital cushion.
- The **digital cushion** is compressed from both above (by the phalanx) and below (by the frog), with abaxial spreading being constrained by the flexible cartilages.

- Toe Strike:

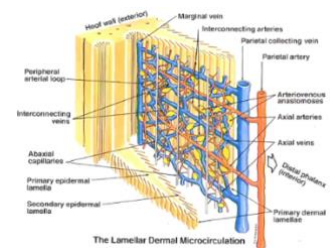
- After the heels, the **toe** hits the ground. **Compressive forces** travel up the hoof wall towards the **coronary surface**.
- The **hoof wall** is resistant to compression but can bow slightly under pressure.
- The **epidermal lamellae** interlock with the **dermal lamellae**, allowing slight sliding but not full separation.
- The hoof wall pushes against the **coronary border**, with forces absorbed by the **coronary cushion**.



Vascular Components:

- Venous plexuses in lamina dermis and coronary dermis help pump blood upwards.

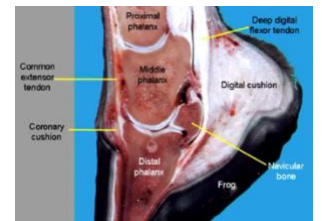
- These **valveless venous plexuses** allow blood to flow in multiple directions, aiding circulation when the hoof strikes the ground.
- **Arteriovenous anastomoses** can open or close to regulate blood flow within the dermal laminae.



Laminitis:

- Damage to the dermal lamellae (e.g., due to laminitis) causes weakening of the attachment between the epidermal lamellae and the underlying bone.

- **Inflammation** in the lamellae leads to **separation**, allowing the bone (phalanx) to rotate and push through the sole.
- This is an **excruciatingly painful** condition, akin to pulling fingernails off with weight pressing down on them.
- The hoof wall detaches from the underlying bone, and the bone may eventually pierce through the sole.



- Factors Contributing to Laminitis:

- Laminitis is often linked to **bacterial endotoxins** in feed, which cause **arteriovenous anastomoses** to open improperly, reducing blood flow to the dermal lamellae and causing **shrinkage** and **separation** from the bone.

Shock Absorption in the Hoof:

- The **frog** plays a critical role in spreading the heels apart and absorbing shock as the hoof strikes the ground.
 - **Horseshoes** are applied to prevent abnormal wear on hard surfaces like stone or concrete, but care is taken not to nail them around the **palmar aspect** to preserve the natural spreading forces.

Key Points to Remember When Applying Horseshoes:

- Horseshoes should be nailed at the **dorsal aspect of the toe**, allowing the **heels to spread** naturally.
 - This ensures that the hoof's **shock absorption** mechanisms are not restricted.

| Lameness | Notes | Clinical signs and Diagnosis | Treatment and Others |
|--------------------------------|---|--|---|
| Subsolar (Hoof) Abscess | <p>Definition: Infection within the hoof capsule, usually from bacteria entering via the white line or from penetrating injuries (e.g., nails)</p> <p>Predisposing: Penetrate trauma, hoof cracks, laminitis, bruises, foreign bodies, seedy toe, keratoma</p> | <p><u>Clinical Signs</u> Sudden, severe lameness (can be non-weight bearing), increased digital pulse, heat in hoof, positive response to hoof testers, sometimes visible tract or pus at sole/coronary band</p> <p><u>Diagnosis</u> Palpation, hoof testers, nerve blocks (to confirm foot origin), radiographs (to rule out fracture or locate gas/pocket)</p> | <p>Antibiotics NOT indicated for <u>uncomplicated abscesses</u> (⊕pus)</p> <p>Drain abscess by paring at site of pain (along white line or tract)</p> <ul style="list-style-type: none"> - Paring at localised region of pain along the white line - Follow black tracks - Pus from foot abscesses is grey to black in colour - Stop paring if starting to see pink colouration or bleeding <p>Soak foot in warm water with Epsom salts to soften for paring and drainage</p> <p>Apply poultice (e.g., Animalintex), hyperosmotic bandage (encourage further softening of foot and drainage of abscess), homemade (warm water, epsom salt, sugar, iodine)</p> <p>Waterproofing with duct or cloth tape</p> <p>NSAIDs for pain relief; tetanus vax</p> |
| Cellulitis | <p>Definition: Infection of the subcutaneous tissue, usually from bacteria entering through a break in skin (wounds, IV catheter sites, small cuts) of small wounds that seal quickly with minimal drainage</p> <p>Predisposing: Distal limb, poor lymphatic/venous drainage (stabled horses, previous limb wounds), subcutaneous edema</p> | <p><u>Clinical Signs</u> Rapid swelling, heat, pain, soft pitting edema, mild-severe lameness, min. drainage</p> <p><u>Diagnosis</u> Palpation, lameness, radiographs (rule out fracture), ultrasound (rule out tendons and synovial structures → assess soft tissue, fluid), consider differential diagnoses (fracture, lymphangitis, tendon infection, etc.)</p> | <p>Antibiotics (systemic – TMS oral, penicillin, gentamicin and/or local/ regional - gentamicin)</p> <p>NSAIDs for pain/inflammation: phenylbutazone</p> <p>Bandaging, cold hosing (10 mins BID), controlled walking to improve drainage</p> <p>Tetanus vaccination</p> |