The Equine Foot: Basic Anatomy, Care and Common Problems

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Importance of Equine Hoof

- Foundation of the horse
  - Healthy hooves benefit the horse and the owner
- Horse’s hoof is possibly its most critical and complex structure
  - 4 layers to the hoof wall
  - Hoof wall, sole, frog encapsulating structures within
  - 3 bones
  - 1 fluid-filled bursa
  - 4 tendon/ligament insertions
Anatomy of a Normal Hoof

- **Toe**

- **Quarters** – medial and lateral hoof wall

- **Heel**

- **Bars** – heel to center of foot
  - Allow the foot to expand with each step
  - Increase weight-bearing surface

[Source: www.wisc.edu/ansci_repro/101equinelab/anatomy/anatomy.html]
Anatomy of a Normal Hoof

- **Frog** – wedge-shaped, elastic structure
  - Shock absorber
  - Pumps blood out of the foot

- **Sole** – majority of ground surface
  - Bears internal weight
  - Should not contact the ground

www.wisc.edu/ansci_repro/101equinelab/anatomy/anatomy.html
Anatomy of a Normal Hoof

- Circular shape
- Thick hoof wall
- Symmetrical
- Widest part of hoof at quarters
- Concave sole
- Healthy frog
Anatomy of a Normal Hoof

Front

Hind
Anatomy of a Normal Hoof

- **Coffin Bone (Third Phalanx):**
  - Suspended in hoof capsule

- **White Line:**
  - Extends from solar surface
  - Junction of laminae

- **Coronary Band (coronet):**
  - Junction of hoof wall and skin
  - Hoof wall grows downward
Anatomy of a Normal Hoof

- **Navicular bone and bursa**
  - Allows deep digital flexor tendon (DDFT) to bend around the bones inside the foot and insert onto the coffin bone
  - Navicular disease

- **Digital Cushion**
  - Primary shock absorber
  - Energy and concussion absorbed via the frog

www.horsescience.com
Why Does the Equine Hoof Need Regular Trimming?

- Hoof grows continually
  - An entire new hoof capsule will grow within 9-12 months
- Horses wear hooves unevenly
  - May cause damage and distortion to the foot
  - Secondary lameness from soft tissue strain
- Trimming maintains a normal hoof shape balance and length
Influences on Hoof Growth

- **Age of horse**
  - Foals versus older horses

- **Seasonality**
  - Spring-summer versus fall-winter

- **Most horses need trimmed every 6-8 weeks**
  - Therapeutic reasons
  - Performance disciplines

- **Overall health, medical issues**
Influences on Hoof Growth

**Nutrition**

- **Pasture**
  - Grass quality has a significant effect on growth
  - Spring versus late summer

- **Hay**
  - Quality impacts hoof growth
  - Alfalfa versus grass

- **Grain**
  - Sweet or pelleted feed
  - Complete feed
  - Feed appropriately for weight
  - Ration balancer

- **Supplements**
  - Farrier’s Formula®
  - Nu-Foot™
  - SmartHoof®
Hoof Evaluation

- Assess conformation of the legs
- Watch the horse move
- Evaluate the foot conformation and hoof-pastern axis
Broken Back Hoof-Pastern Axis
Broken Forward Hoof-Pastern Axis
Classic High-Low Conformation
Trimming for Healthy Hooves

- Maintain or establish a good hoof-pastern axis
- Use widest point of the foot for the center of rotation
- Establish a heel base, trim the heels to the widest part of the frog if possible
- Shorten toes – decreases strain on toe and tendons and ligaments
- Preserve sole depth – concave sole
Heels dressed to include the frog

Widest part of the foot

What cannot be achieved in the trim, may be achieved with shoe placement

Approximate distances

Shoe placement
Fergus is missing two shoes this time, Dad.

Doggone it! Which two?
The Purpose of Shoes

- Protect and maintain hoof quality
- Improve traction in performance horses
- Complement or enhance a gait
- Therapeutic purposes

- Shoes are steel, aluminum, plastic, or wood
  - Nailed into the hoof wall at the quarters
  - Glue-on shoes are becoming more common
Steel Shoes

- Most basic shoe, least expensive, “original shoe”
- Strongest type of shoe
- Fairly easy to shape
- Many uses – simple shoes to therapeutic
- Heavier than other materials
Aluminum Shoes

- Lightweight
- Primarily a race horse or therapeutic shoe
- Typically nailed or glued in place
- Wear quickly – wear plate in some
- Expensive (2-4 times more than steel)
Plastic Shoes

- One of the lightest shoes available
- Can be nailed on or glued
- Flexible shoe
- Shock absorbing
- Expensive
- Difficult to shape to foot
- Available in many sizes
Therapeutic Shoes
Therapeutic Shoes

www.grandcircuit.com
Proper Nail Placement

Horseshoe nails are angled to match the angle of the hoof wall

Nails should be placed in the white line & outer hoof wall

Courtesy of Jeff Ridley
Anatomic widest part of the frog

Underrun heel

Excess toe
You've almost got that shoe off. What are you waiting for?

The farrier. He hasn't left yet...
Hoof Diseases - Thrush

- Destruction of frog by anaerobic bacteria
  \emph{(Fusobacterium necrophorum)}
  - Foul-smelling black greasy material present in the frog
  - Atrophy of the frog
  - Lameness is possible

- Predisposing factors – wet stalls, muddy pastures, poor hoof care including overgrowth
Hoof Diseases – White Line Disease

- Widening of the white line and subsequent infection
  - Separation of the hoof wall from the sole
  - “Seedy toe”

- White or grey powdery material at white line, deep crevice at white line, bulging and hoof wall distortion
  - Can become packed with dirt and small stones as well

- Common causes include poor hoof conformation, laminitis and possibly excessive environmental moisture

- Lameness if severe
Hoof Diseases – White Line Disease

www.cavallo-inc.com
Hoof Diseases – Hoof Cracks

- Occur at toe, quarter, and heel
- Severity depends on depth and underlying tissue involvement
- Environment, season, and infrequent trimming play a role in development
- Stabilization necessary if lameness present
Hoof Diseases – Hoof Cracks
Hoof Diseases – Sole Bruising

- Most common in flat-soled hooves
- Also seen with rocky or hard or frozen ground
- Following a hoof trim

- Lameness
- Reddened tissue in the sole – at toes, heels or both
- May heal with time or become a subsolar abscess
- Shoeing (+/- pads) may prevent bruising
Hoof Diseases – Sole Bruising
Hoof Diseases – Subsolar Abscess

- Infection or inflammation of sensitive tissue of the foot
- Common sequelae of puncture wound, severe bruising, or laminitis
- Severe acute lameness
- Untreated, will migrate dorsally along hoof wall and rupture at coronary band

- Abscesses should be opened and drained from sole to prevent coronary band disruption
Hoof Diseases – Subsolar Abscess
Take Home Points

- **NO FOOT truly equals NO HORSE**
  - Without a balanced, healthy base lameness can occur

- **Routine hoof care includes regular trimming and good nutrition**

- **Shoes are not always necessary, but provide protection, enhance performance, and are used therapeutically to treat many diseases and disorders**