What constitutes good foot conformation?
And how do we determine it?

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We have come a long way...

But have we left the basics of farriery behind?

Roman 100 AD
Visani 2022

Education is Not The Learning of Facts
It's Rather The Training of The Mind To Think

Sooo...if you think about one aspect of farriery or the foot differently...this presentation will be a success!

“Knowledge isn’t free. You have to pay attention.”

Our Goal: A healthy foot
Why a healthy foot?!

- Promotes soundness and allows the horse to perform at the highest level possible
- Greater than 70% of forelimb lameness are either localized to the foot or related to the foot if it occurs in the limb above
- Is the best possible deterrent to prevent lameness in equine veterinary medicine

There is no free lunch...

Every time farriery is performed on a horse’s foot...

- The anatomical relationship of the structures within the foot will change
- The biomechanical forces exerted on the foot / digit will be affected

It takes a village...

The ideal

<table>
<thead>
<tr>
<th>Owner</th>
<th>Trainer</th>
<th>Farrier</th>
<th>Veterinarian</th>
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The horse’s foot is unique as it is a biological entity that follows the laws of physics.

(S. O’Grady, 2009)
A Mechanical Marvel

Illustration by Dr. Chris Pollitt

A ‘normal’ foot is hard to define as the foot is an individualistic anatomical entity for a given horse. Why not consider using the term good foot, healthy foot or functional foot?

Watch the horse walk!
Marked heel first

Watch the horse walk!
Toe first

Watch the horse walk!
Asymmetrical

Let’s build a model of what is considered a good foot.
Good Foot Conformation

Width of frog should be 70% of the length

Basic Farriery
- **Trimming** is the “mainstay” of farriery
- Application of the shoe
  - Protect and compliment the trim
    - Size, type and placement of shoe
    - Breakover modification
    - Heel elevation

A few things your mother told you never to discuss in polite company
- Politics
- Religion
- Sex
- “Hoof Balance”
Hoof Balance

What is it?

There is no definition...it is a concept!

Hoof Balance

There is:

- Static balance
- Dynamic balance
- Natural balance
- 3-dimensional balance

How can we satisfy all of these?!

Hoof Mapping???

Lots of methods / cumbersome

Guidelines for Trimming

- Hoof-pastern axis
- Center of rotation
- Ground surface of hoof capsule extending to the base of frog or trimmed to include the frog (the same plane)


The Hoof-Pastern Axis

Straight    Broken-back    Broken-forward
The Hoof-Pastern Axis

Suffice to say…the hoof angle is correct for a given foot if the hoof-pastern axis is parallel / straight
Reasonable to say, the HPA is the best estimator of the angulation of the DIP J without a radiograph!

Center of Rotation

Correlates with the widest part of the foot

Think Proportions!
Foot Conformation
Using the *center of rotation*

Center of Rotation
Example

Radiology allows us to apply biomechanics
Center of Rotation
Radiology

Ground Surface of the Foot
Extends to the base of the frog

Short shoes
The Palmar foot

Trimming the heels...
Often controversial
Many theories / thoughts
**BUT...**the anatomy and biomechanical principles are factual...

Heels do not grow tall!
Heels grow forward!

Trimming the heels

- ‘Don’t lower the heels’ should be removed from the farriery language
  - Heels grow forward not tall
- Trimming the heels to the base of the frog increases ground surface on the bottom of foot
  - Improves foot conformation

Trimming the palmar foot
‘Heels load sharing’

There is a difference
Assess the heel structures

Heels migrating dorsally
Heels migrating dorsally

Negative Plane of the Distal Phalanx
Negative Plane of the Distal Phalanx

What is it?

- It is a Radiographic Symptom
- Indicative of dorsiflexion of the DIPJ
- Common Clinical Features
  - Broken-back HPA
  - Low heels
  - Dorsal sole depth ↑
  - Increased sole concavity

Symptom leads to the disease

Negative Plane of the Distal Phalanx Angle correlates with tension in DDFT

Flexural deformity occurs when toe is overloaded and heel is underloaded

Dorsiflexural deformity occurs when heel is overloaded and toe is underloaded

Pathogenesis:
Possible Mechanisms

- Primary heel collapse
  - Normal structures / abnormal load
  - Weak structures / normal load
    - secondary damage of palmar foot structures
    - secondary lengthening of DDF?

Negative Plane of the Distal Phalanx Causes

- Many factors or combinations contribute...
  - Genetics
  - Breed predisposition
  - Development of foot as a youngster
  - Limb / foot conformation
  - Amount of work
  - Footing / surfaces
  - Inappropriate farrier practices
Negative Plane of the Distal Phalanx

Reality check!

- Means you have lost the soft tissue mass in the palmar section of the foot
- This allows the palmar processes of the distal phalanx to descend

Heel Growth Framework

Farriery Principles

- Barefoot
- Reduce toe length / leverage
- Increase ground surface…trim/shoe
- Redistribute weight bearing
- Breakover

Hunt RJ. Farriery for the Hoof with Low or Underrun heels. Vet Clinics N America Equine Practice 2012


Prognosis

- If primary heel collapse caught early without secondary changes → fair for reversibility
- If primary heel collapse with secondary changes → long term management
- If primary increase in DDF length/decrease in tension → long term management

Thoughts….

- Distal phalanx negative angle is a radiographic symptom (not a disease)
- Would be better named “dorsiflexural deformity”
- Several potential causes and therefore, different approaches
- Reversibility probably depends cause and duration and structural damage
- There is much more to learn about this conformation