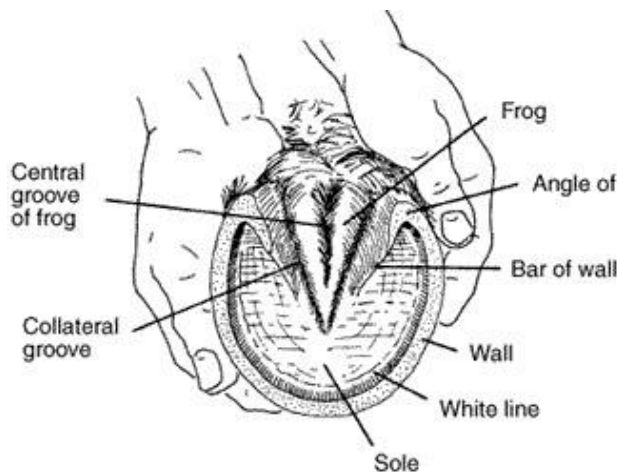


Functional Anatomy of the Horse Foot*

1. A horse's hoof is composed of the wall, sole and frog. The wall is simply that part of the hoof that is visible when the horse is standing. It covers the front and sides of the third phalanx (P3) or coffin bone. The wall is made up of the toe (front), quarters (sides) and heel. When the foot is lifted off¹ the ground, the sole and frog are visible, as well as the bars of the wall and the collateral grooves (Figure 1).

Figure 1

The wall, bars and frog are the weight-bearing structures of the foot.



2. The wall of the hoof is composed of a horny² material that is produced continuously and must be worn off³ or trimmed off⁴. The hoof wall does not contain blood vessels or nerves. In the front feet, the wall is thickest at the toe; in the hind feet, the hoof wall is of a more uniform thickness⁵. The wall, bars and frog are the weight-bearing⁶ structures of the foot. Normally the sole does not contact the ground.

3. Inside the hoof, lateral cartilages extend back and up from the inner and outer sides of the third phalanx (Figure 2a). These cartilages are flexible, but as the horse ages, they are usually ossified⁷ and replaced by bone. Between the second and third phalanges and above the deep flexor muscle-tendon is a small bone called the navicular bone (Figure 2b). The navicular bone and its associated bursa — a fluid-filled sac that reduces friction between the tendon and the bone — are involved in navicular disease, which is a common cause of lameness.

Figure 2a

Internal structure of the horse foot.

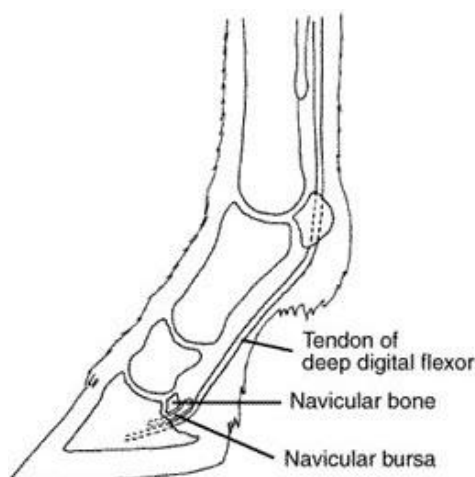
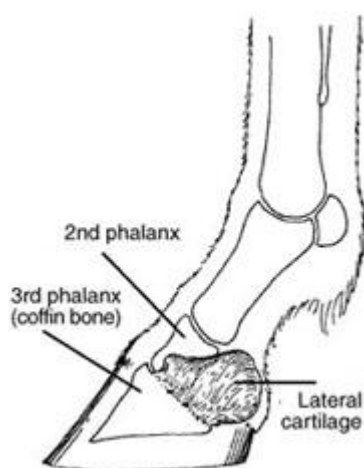


Figure 2b

Internal structure of the horse foot.

Glossary

- 1 lift off** = separate the foot from the ground
- 2 horny** = made up of a horn substance
- 3 worn off** = reduce
- 4 trim off** = cut
- 5 thickness** = the state or quality of being thick
- 6 weight-bearing** = support the weight
- 7 ossified** = become bone or be hardened like bone
- 8 heel** = the back of the foot

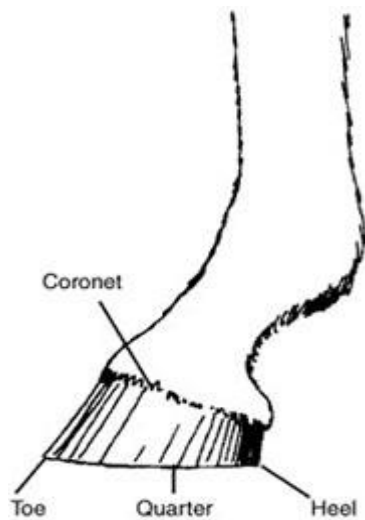


Figure 2c

External structure of the horse foot.

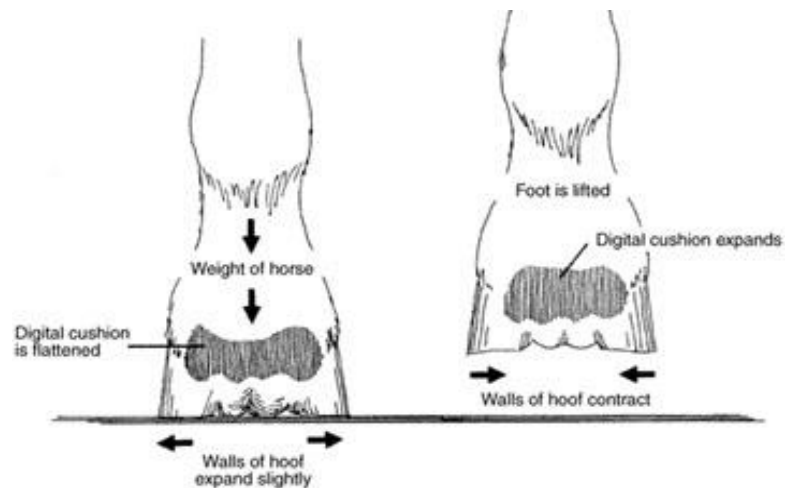


Figure 3

Flexible structures in the horse's hoof expand and contract with each

step as weight is transferred from one foot to another.

4. The digital cushion is a mass of flexible material that contributes to the formation of the heels⁸ (Figure 3). This structure is one of the primary shock absorbers of the foot. As weight is placed on the hoof, the pressure is transmitted through the phalanges to the wall and onto the digital cushion and frog. The frog, a highly elastic wedge-shaped⁹ mass, normally makes contact with the ground first. The frog presses upon the digital cushion, which flattens¹⁰ and is forced outward¹¹ against the lateral cartilages. The frog also is flattened and tends to push the bars of the wall apart (Figure 3). When the foot is lifted, the frog and other flexible structures of the foot return to their original position.
5. When the foot is placed on the ground, blood is forced from the foot to the leg by the increase in pressure and by the change in the shape of the digital cushion and the frog. The pressure and the change in shape compress the veins in the foot. When the foot is lifted, the compression is relieved¹² and blood flows into the veins again. In this way, the movement of these structures in the hoof acts as a pump.
6. Exercise increases the blood circulation in the foot and favours good hoof growth. Lack of exercise, dryness of the horny wall, and poor nutrition inhibit hoof growth. Normally, the hoof wall grows at the rate of about three-eighths inch per month. New layers of the hoof wall are produced continuously from just below an area called the coronet¹³ at the junction of the skin and the hoof wall (Figure 2c).
7. The hoof wall is covered with a material that prevents evaporation of moisture. When this material is deficient, the hoof wall becomes dry and excessive flaking¹⁴ and cracking¹⁵ may occur. A good hoof paint aids in preventing excessive drying.

Glossary

9 wedge-shaped = with the form of a wedge

10 flattens = to become flat

11 outward = towards the outside; out

12 relieved = to free from anxiety, fear, pain, etc

13 coronet = small crown

14 flaking = to peel off or separate in flakes

15 cracking = to break without separation of parts

*This publication was originally written jointly by Robert C. McClure, Gerald R. Kirk and Phillip D. Garrett. Kirk and Garrett are former faculty members in the Department of Veterinary Anatomy (University of Missouri) College of Veterinary Medicine. Illustrations are by Phillip D. Garrett. Lesson format designed by José Henríquez G.

Tasks

1.- Write down all the terms you identify as most familiar in the anatomy of the horse's foot.

2.- Discuss which sentences describe functions, or processes of the horse's anatomy foot in the text, mention the more sentences as you can.

3.- **Focus on the form:** identify these sentences in the correct paragraph.

a) When the foot is lifted off the ground...

b) When the foot is placed on the ground...

c) Exercise increases...

d) Lack of exercise...

4.- **Comprehension:**

a) It's digital cushion and frog the same structure?

b) What is the following statement talking about?
"A good hoof paint aids in preventing excessive drying".

c) Which factors inhibit hoof growth?

d) The digital cushion is a mass of flexible material that contributes to the formation of the hoofs.

true / false

e) The sole is always in contact with the ground

true / false

f) The Coronet is one of the primary shock absorbers.

true / false

g) The coffin bone is located in the second phalange (P2)

5.- **Critical Thinking**

What is the correct order of this questionnaire?