

ANATOMICAL CONSTANTS OF THE HEALTHY EQUINE HOOF

The coffin bone is the template for the hoof capsule. A hoof that fails to reflect the shape of the healthy bone is deformed.

In a side view, a profile of the coffin bone is roughly triangular. The longest side of the triangle is its base (the distal border), the template for the shape of the ground surface of the hoof capsule. A collection of coffin bones from horses' fore feet show relatively little variation from one horse to another with regard to the angles of the triangle. The same is true of the hind feet. Depending on the size of the horse from which the bones came, there will be some variation in the size of the bone but the angles will be more or less constant. For this reason, there is constancy to the shape of the hoof capsule, as seen from the same side view. The following geometric constants are recognized:

1. When the foot is bearing weight, the distal border (base) of the coffin bone must be parallel to the ground, to allow for even distribution of forces.
2. As the healthy hoof capsule duplicates the contours of the bone, it follows that the base of the hoof capsule (the palmar and plantar surface of the hoof) must also be parallel to the base of the coffin bone.
3. To achieve the above it follows that, in a normal front hoof, the wall/ground angle at the toe will be about 45° and the coronet/ground angle will be about 30°
4. Similarly, in a normal hind hoof, the wall/ground angle at the toe will be about 55° degrees and the coronet/ground angle will be about 30°, because these are the angles that the coffin bones, by themselves, exhibit when the bones are placed upright on a flat surface.

Any gross departure from the above angles, on either side, indicates a deformity of the hoof capsule.

If the angles are correct (the last two criteria), the orientation of the coffin bone and the sole of the hoof (the first two criteria) will also be correct. Thus, the two criteria that provide the key to recognizing deformity from a side view are any gross departure from:

- A. A wall/ground angle at the toe of about 45° for the front feet and about 55° for the hind feet.**
- B. A coronet/ground angle of about 30° for both the fore and hind hooves**

The solar surfaces of the coffin bones are concave, with the hind limb bones being even more strongly arched than the fore limb. Accordingly, fore and hind hoof soles should be concave, with the highest point of the sole at the apex of the frog. Flat hoof soles are deformed soles. Similarly, the shape of the hoof sole is determined by the shape of the distal border (base) of the normal coffin bone. An imaginary line extending the collateral grooves of the frog beyond the heels should pass outside the curves of the bulbs. Hooves with heels that converge strongly are deformed. Thus the two tests of normality as judged from the ground surface of the hoof are:

- C. A concave sole**
- D. The frog test**

As the coffin bone seen from the front is a cone, with its base wider than its top, the hoof should have a corresponding shape:

E: The coronet should be parallel with the base and the side walls should be of equal height

F. The side walls should slope outwards at the same angles as the coffin bone. In the hind hoof, the medial wall is the steepest.