Hoof Mechanism - How Does the Hoof Function?

This model was an exercise in our hoof education class. When built correctly, it demonstrates how the bare hoof functions and is an excellent tool to teach horse owners. The idea comes originally from Professor Ruthe, who taught in the 1960s at the veterinary faculty of the Humboldt University in Berlin, Germany. We recommend that every students builds such a model, according to the instructions given here.

An upside down bucket, cut at an angle and opened vertically, will demonstrate the mechanism of the hoof capsule
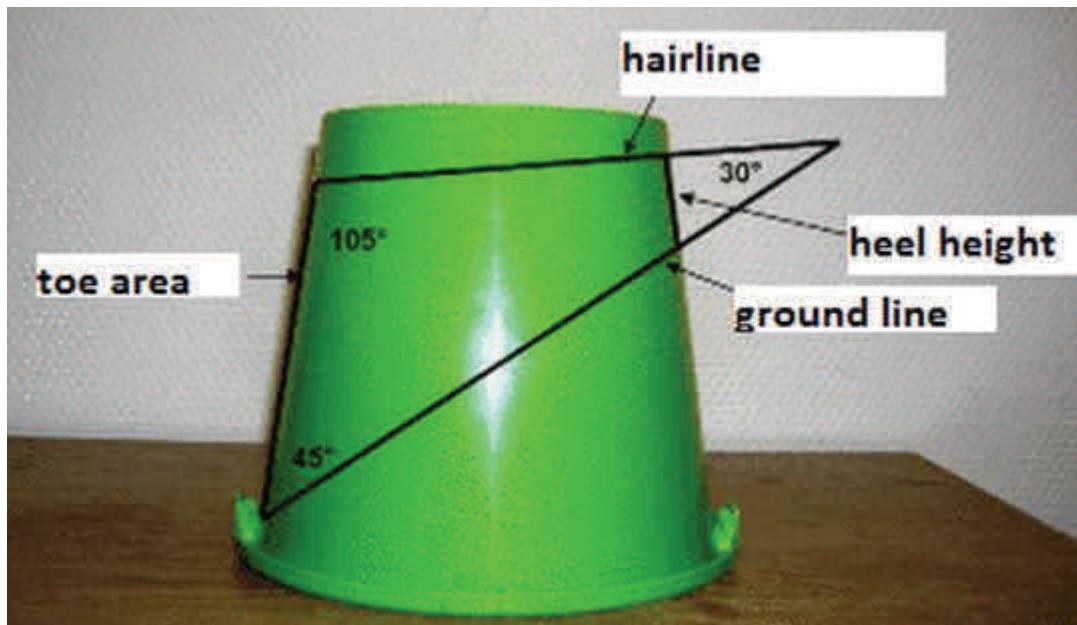
Take a bucket, remove the handle and turn the bucket upside down
(You also can use a yoghurt cup to get a feel for this kind of model)
Now draw the correct angles onto the bucket:
Coronet-toe: 105°
Front hoof toe to ground: 45°
Hairline angle: 30°
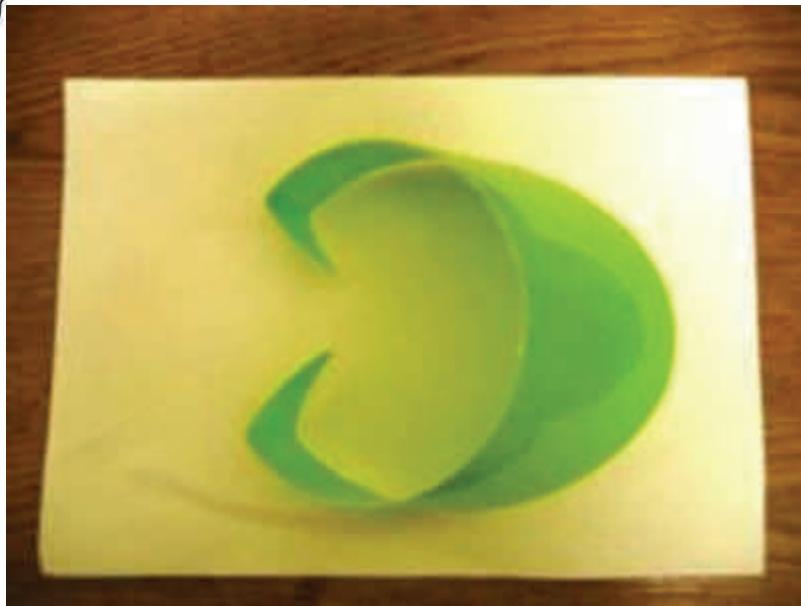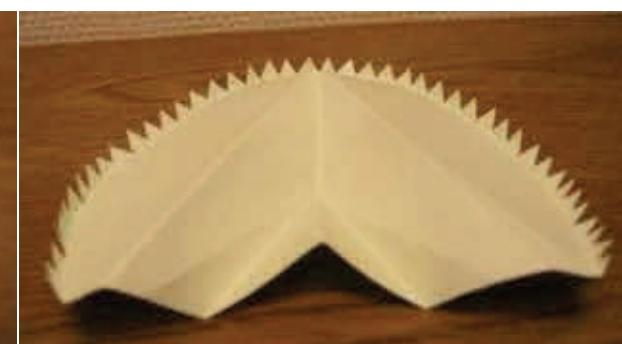
As a result you will obtain the form of a hoof capsule. The "bars" have to be bend inward to resemble the anatomically correct form.

To form the sole you have to take a piece of stiff paper and fold it to resemble the sole, including the frog and the collateral grooves (see pictures). Cut the edges, so they may be glued into the hoof capsule


Ground view from front
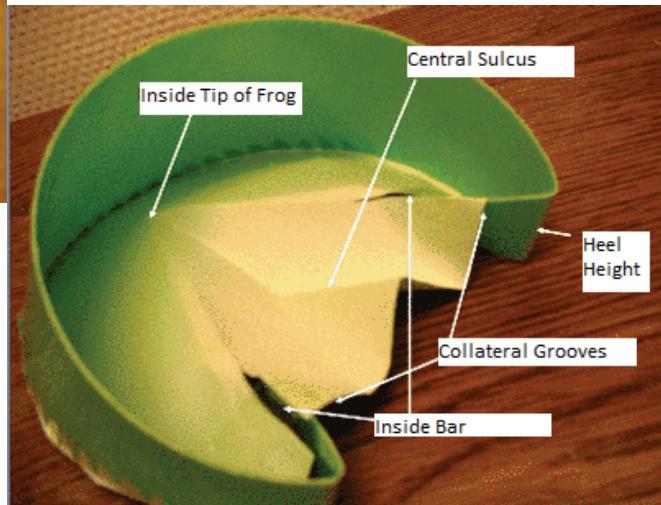
Inside view from back

This is still a flat paper…

Central Sulcus

Inside Tip of Frog

Heel Height

Collateral Grooves

Inside Bar
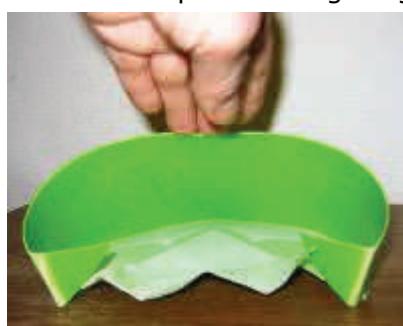
Once you have glued the sole into the hoof capsule, you have a perfect model:

Hoof Mechanism at the Bucket Model

Pressing down on the frontal "hairline" simulates the pressure that is transferred on-to the hoof capsule during weight bearing.
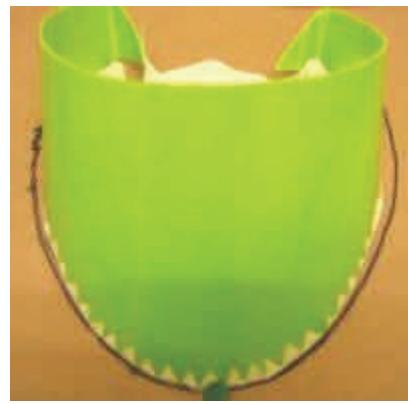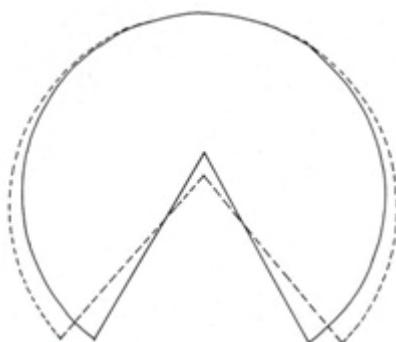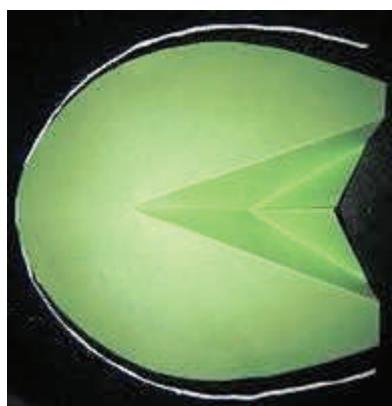
To make this more clear, you may draw a line around the distal margin of the model during weight bearing. Then you will see in the non-weightbearing phase how the hoof capsule returns to its more contracted state.

This schematic drawing shows the difference between weight-bearing and non-weight bearing of the model (hoof capsule).

The sole is getting flatter during weight-bearing. Now draw a line onto the underlying surface during this

phase. Then you will see during the non-weight-bearing phase that the sole is widening more and more, beginning at the toe. In this way the walls also will expand sideways. There is no other way.
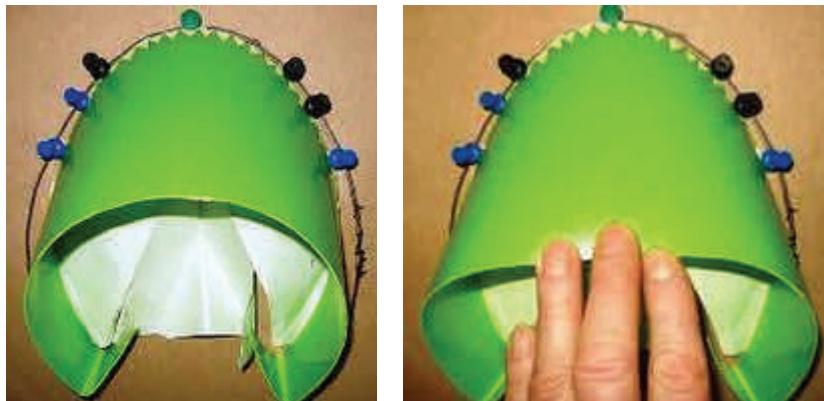
Fixated Bucket Model (Compare to Shod Hoof)
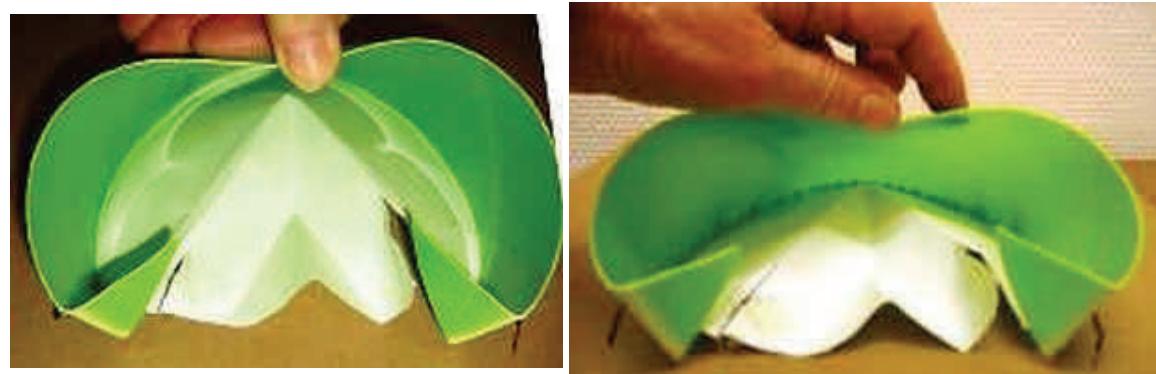
Once the hoof capsule is fixated by nails and a shoe (while being in a non-weight-bearing situation) the sides of the hoof can no longer spread out. The coronary band is now deforming, but the solar vault can no longer become flatter, since the hoof horn cannot move away sideways. Therefore the sinking coffin bone has no room to move properly.
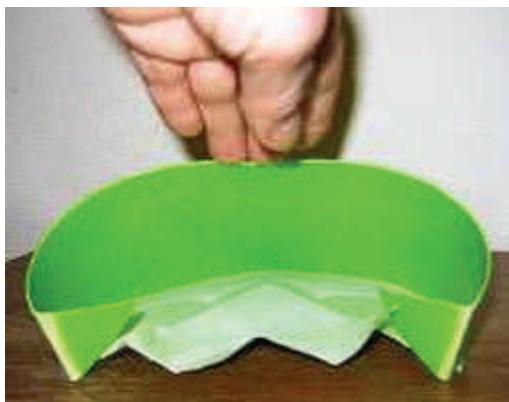
The hoof capsule is now fixated on top of the same drawing from the previous experiment. When pressure is asserted onto the coronary band, the only thing that is moving is the coronary band. The rest of the hoof remains fixated in the same position.

In a fixated hoof capsule the solar vault remains the same, it cannot draw flatter.

Just for comparison: The healthy hoof spreads, the solar vault draws flatter.

Final Comparison

The hoof model with correct physiological angles and a sufficient width shows a wide frog and solar area. The model of a contracted hoof shows a much more pronounced solar vault (solar concavity) and a narrow frog. Because of the excess solar vault the tip of the frog is pressed into the inner hoof.

Left - healthy hoof, right – contracted hoof.
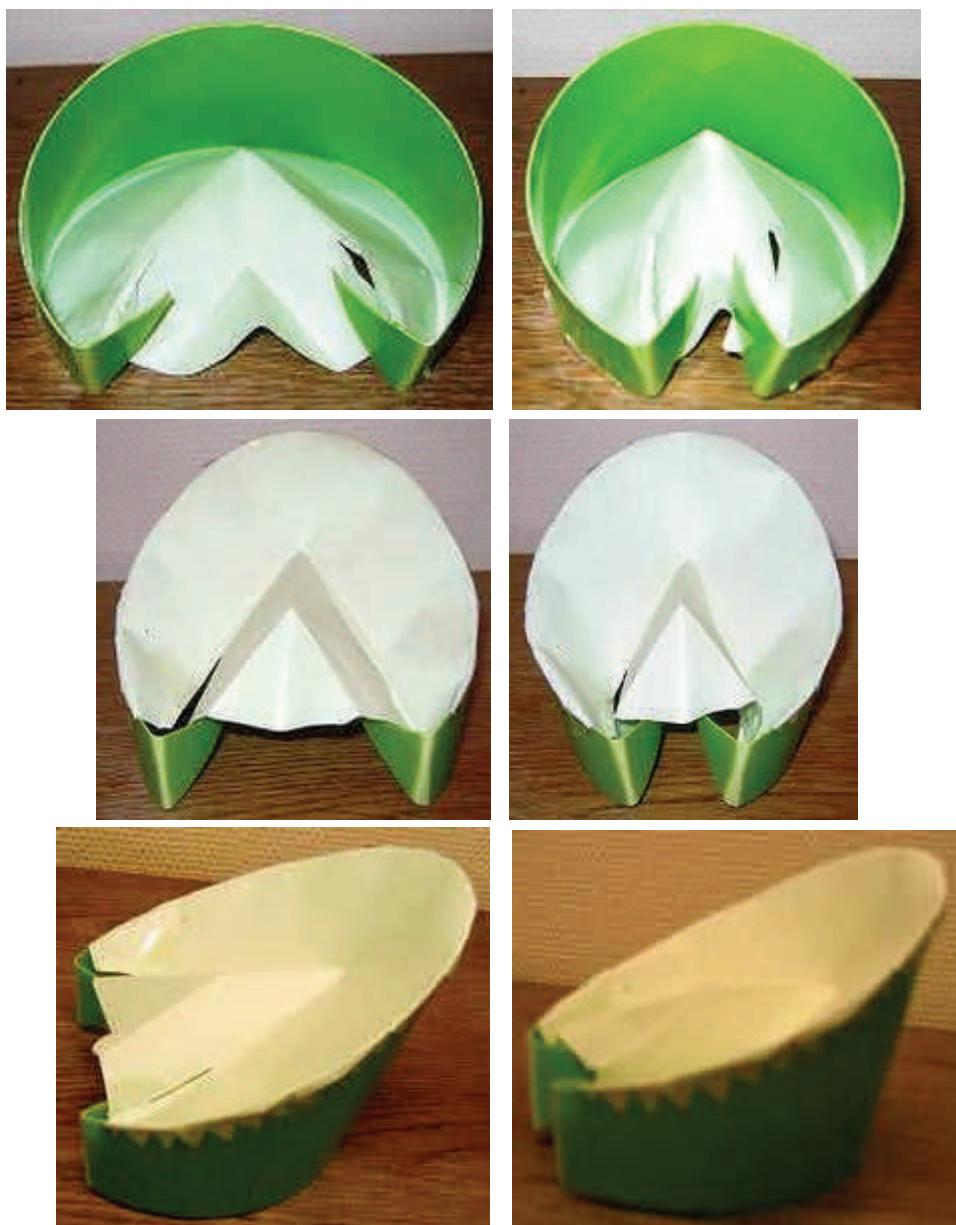
With the help of the here shown hoof model one can study hoof mechanism and the consequences of incorrect hoof form. The detrimental effects a shoe has on the hoof becomes very clear and is easily understood.

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