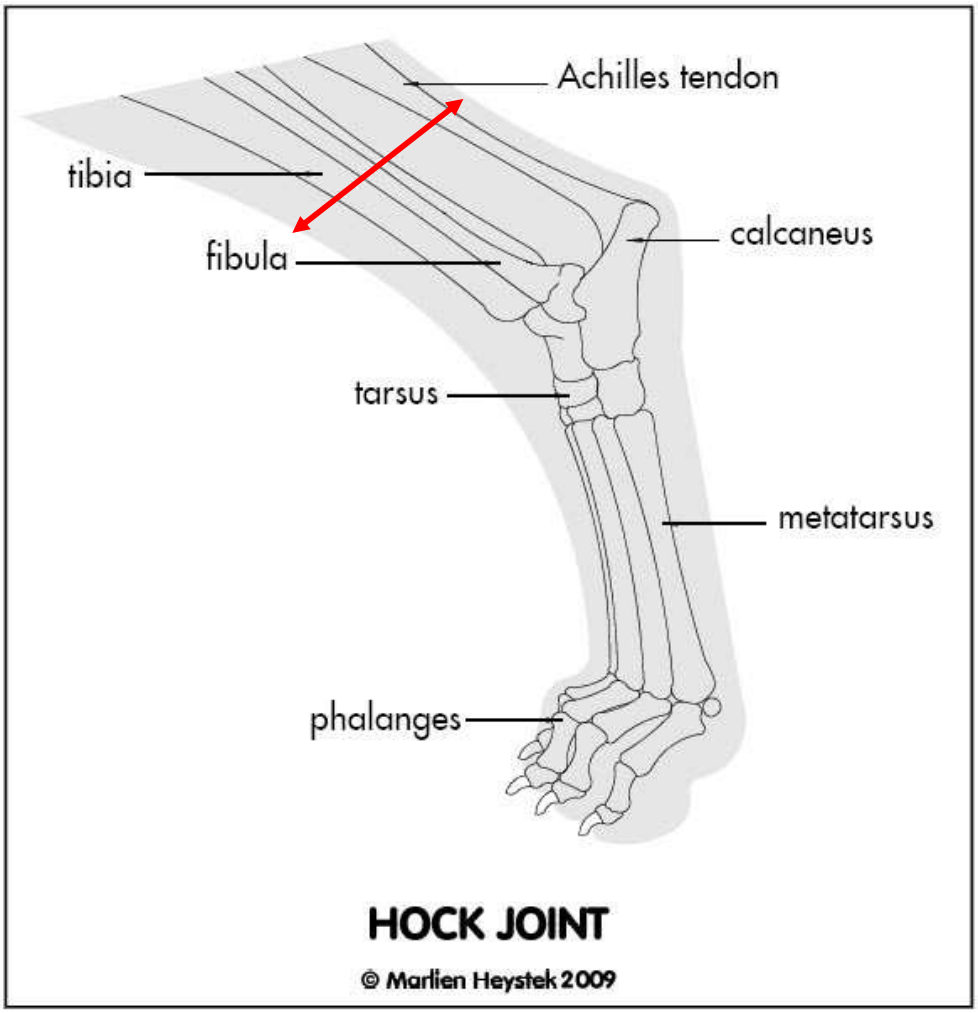
Hyper extension of the hock joint explained

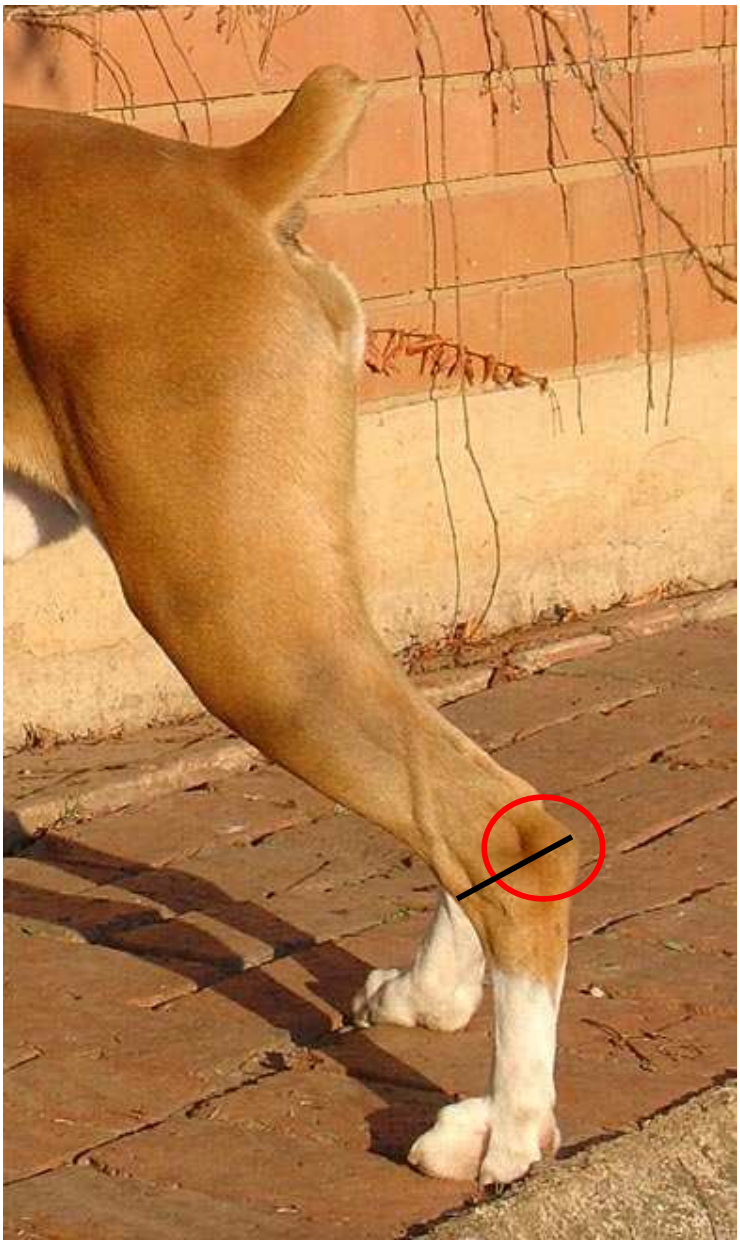
Monique Hodgkinson April 2009

Hyper extension of the hock joint is a very serious conformation fault, and sadly very prominent in so many of the Boxers being shown in Europe at the moment. In concentrating on producing Boxers that are strong and powerful in forequarter, with prominent forechest and well angulated shoulders, the hindquarter has been overlooked. Croups have become too short. Pelvises are also too short and too steeply angled, and considering that the pelvis provides a place for the muscles of the upper thigh to attach to, the shorter and more steeply angled the pelvis, the less length there is to attach the muscles to, resulting in narrow upper thighs.

As the upper thighs get more and more narrow, this seems to be accompanied by hock joints that are also correspondingly narrow, with a very short heel bone or *calcaneus*. The heel bone provides the attachment surface for the *Achilles* tendon. The longer the heel bone, the greater the area of attachment and the broader the lower thigh (red line on diagram below) because the *Achilles* tendon is positioned further away from the actual bones of the hock joint. The shorter the heel bone, the smaller the area of attachment and the shorter the distance between the *Achilles* tendon and the hock joint and therefore the narrower the lower thigh. A lower thigh that is too long just exacerbates this problem and results in even narrower lower thighs.

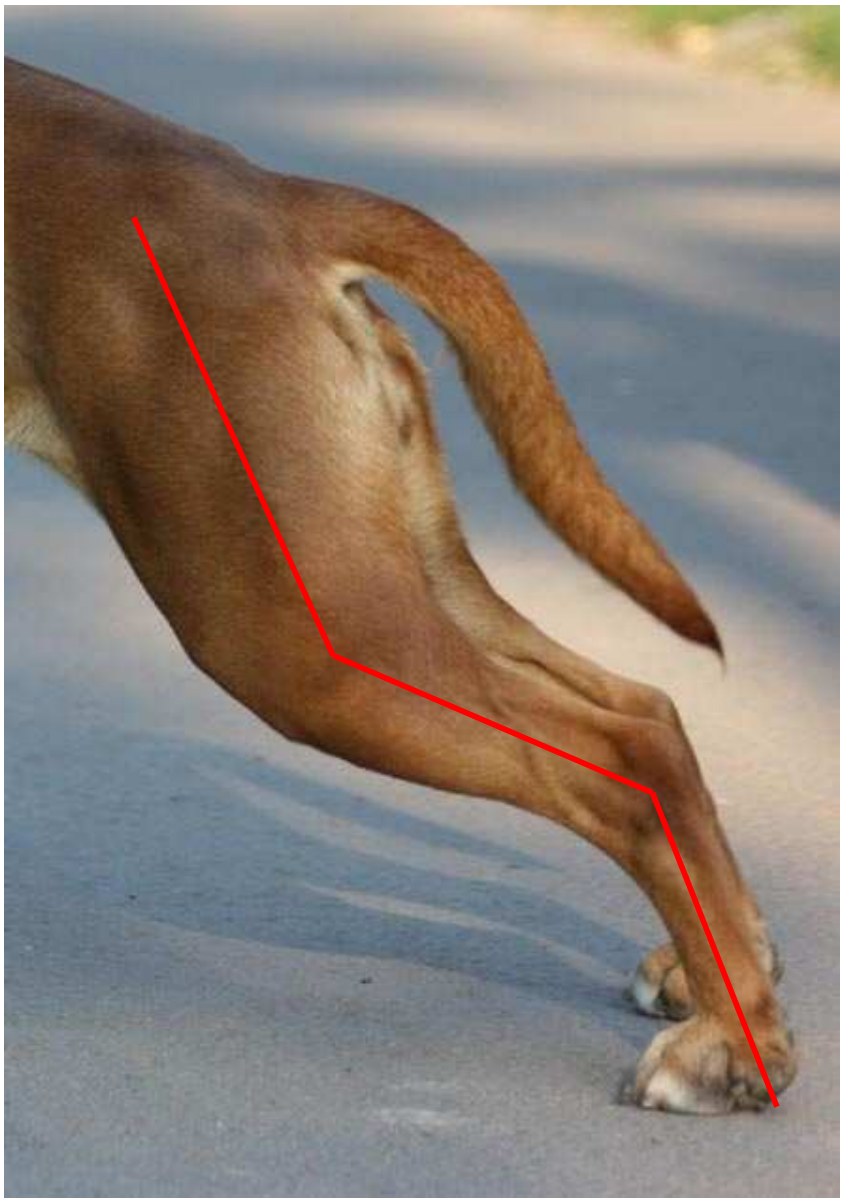


The photo below shows a dog with the heel bone or *calcaneus* of good length, creating a broad hock joint.



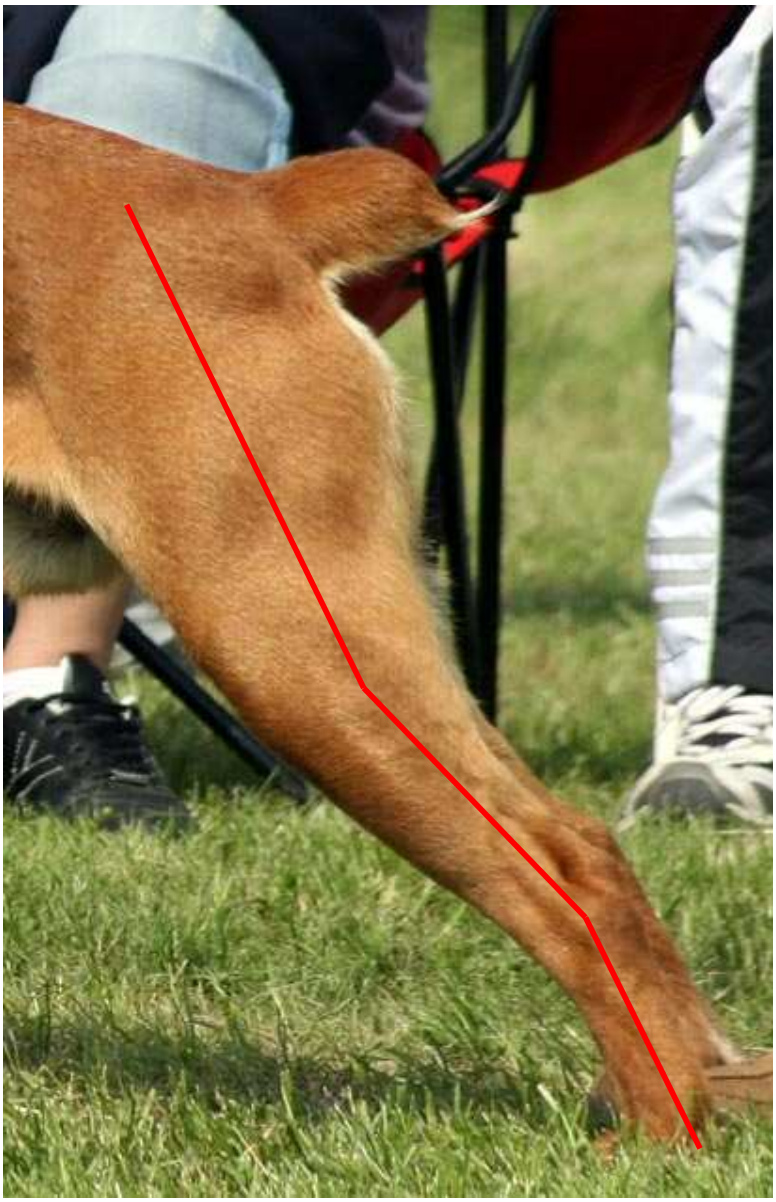
Red circle shows a well defined heel bone or *calcaneus* while the black line shows the width of the hock joint – very wide on this dog because the heel bone is long. This is a strong hock joint.

So, the question is “What is the effect on the hindquarter when the dog has a strong hock joint with a well defined heel bone, and what is the effect when the hock joint is weak and narrow, with a short heel bone?” I have used several pictures to illustrate this, where the dogs are standing stretched out in the hindquarter, as that is where the effect of this is best seen. A dog that has a weak hock joint with a poorly defined heel bone will hyper extend its hock joint, causing the hindquarter to end up forming an almost straight line, while a dog with a strong hock joint and well defined heel bone will maintain angulation through the hock joint, even when stretched out far behind.



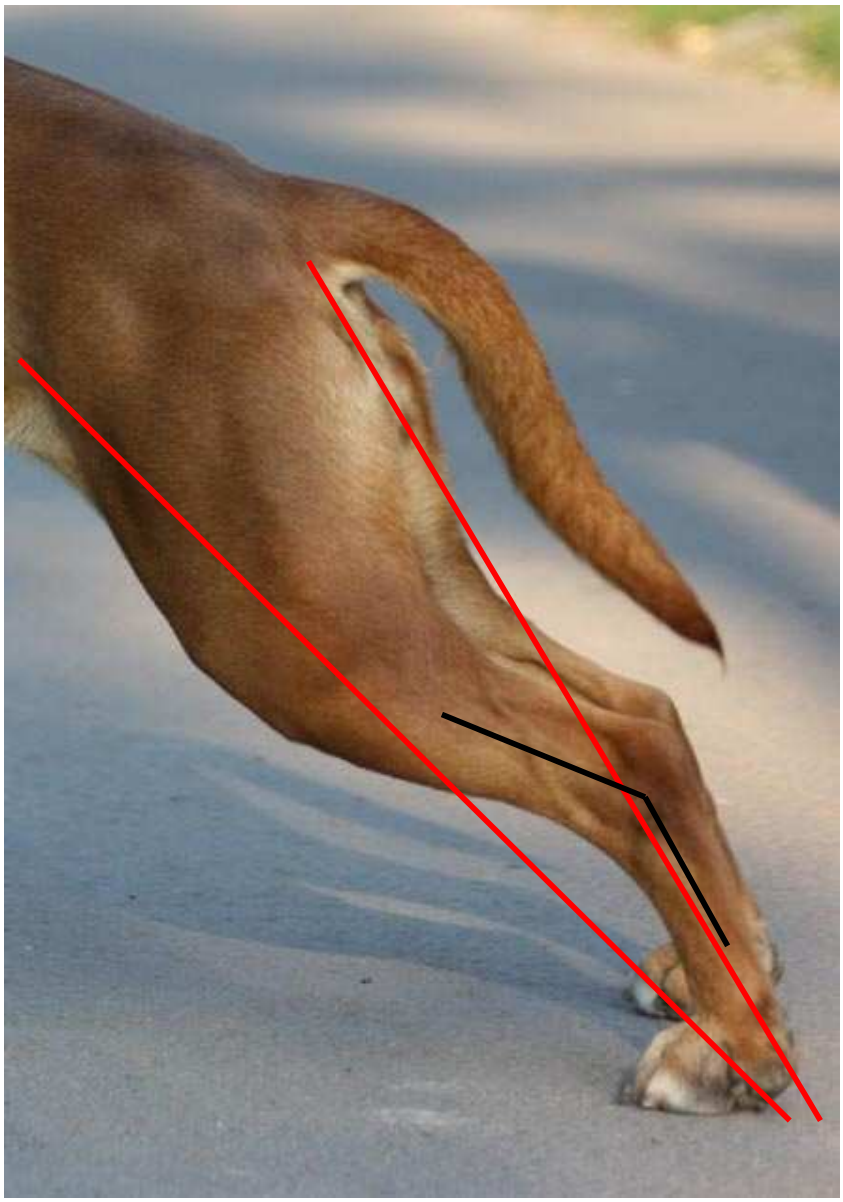
This photo shows perfectly what I am trying to say. The hock joint of this dog is so strong and the heel bone so well developed that even when this dog is stretched out very far to the rear, the hindquarter is definitely not a straight line from pelvis to the foot. The red line shows how the hindquarter does not at any point approach a straight line from the pelvis, through the stifle and hock joint to the foot.

Whereas, with a weak hock joint...

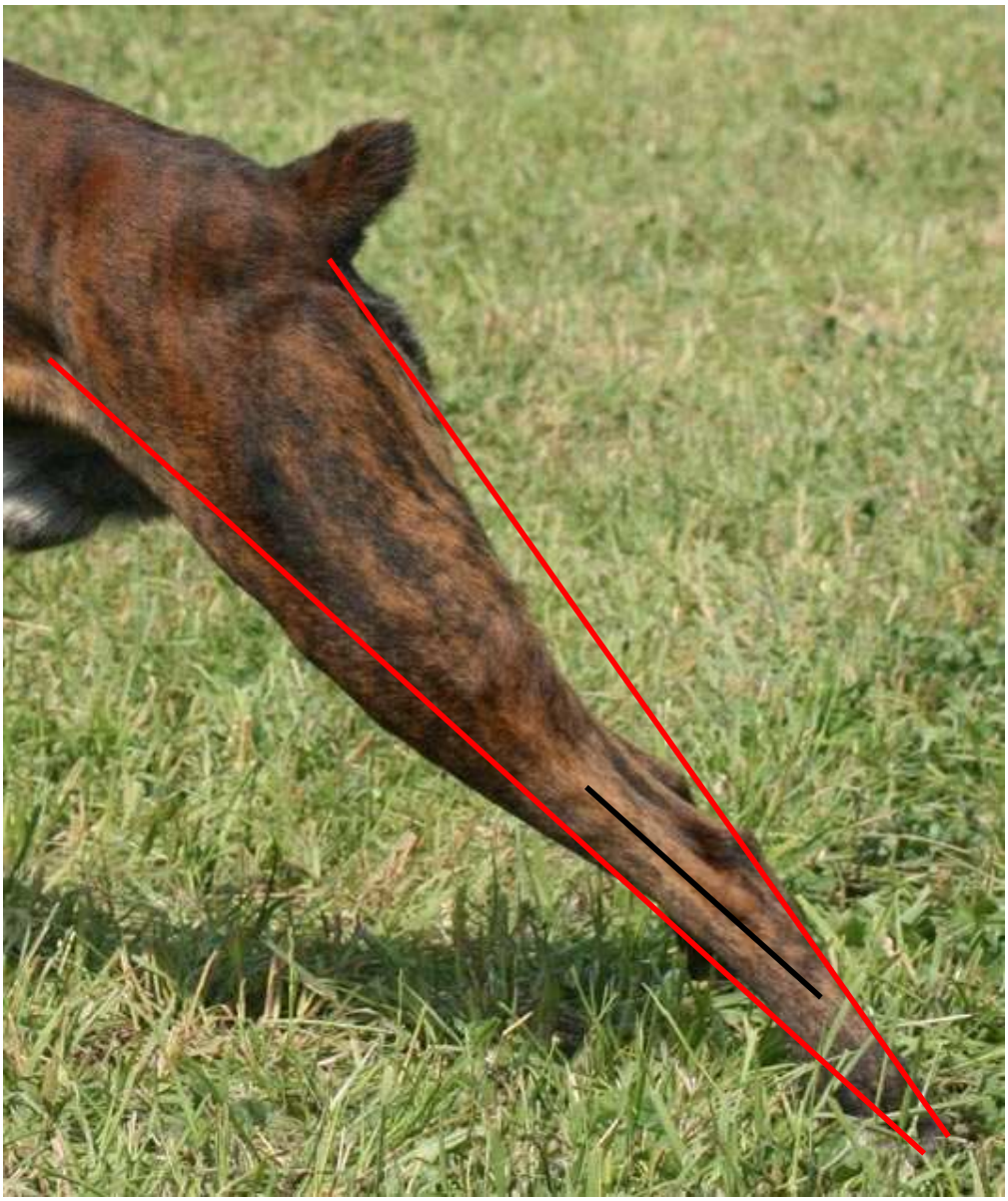


Almost a perfect straight line from the pelvis, through the stifle and hock joint to the foot.

The angle of the hock joint (black line) will never approach 180° for a dog with a strong hock joint, no matter how far back the rear foot is placed as as the heel bone will prevent hyper extension of the joint.

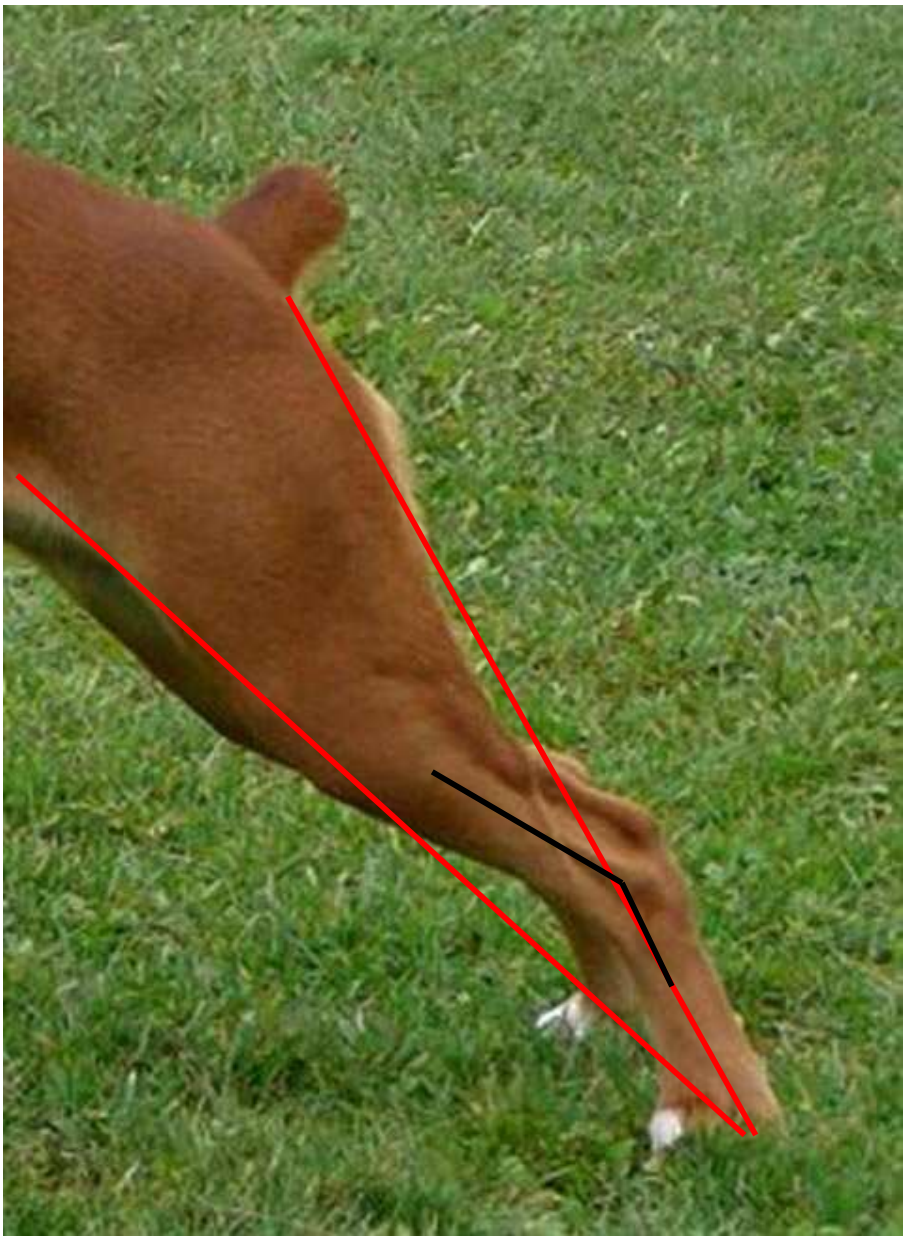


With a dog that has a weak narrow hock joint, the hock joint angle is almost 180° (shown in black). So, when the hock joint approaches an angle of 180°, we say that the joint is hyper extended.



Extreme hyper extension:

Correct hindquarter, with correct hock angulation:



The heel bone should not only be long to allow for the attachment of the *Achilles* tendon. The main function of this tendon is to straighten the hock joint during movement. The joint is activated by a muscle which originates on the upper thigh, runs along the lower thigh and acts on the tip of the heel bone by means of the *Achilles* tendon. A relatively long second thigh (*tibia* and *fibula*) with a short rear pastern (*metatarsus*) and a relatively long heel bone improves the leverage action of the rear pasterns (with the pad as fulcrum) required to provide a complete range of movement in opening the hock and thereby improve endurance. If we could triple the length of the *calcaneus* we could make it work at a mechanical advantage, but the muscle would then not be long enough (would not be able to contract enough) to move it the same distance as in a normal hock joint, which works at a mechanical disadvantage. In the hyper extended hock the mechanical disadvantage is therefore much greater and the efficiency much reduced when compared to the correct hock joint.