Dynamics of the Rear Assembly Part 3

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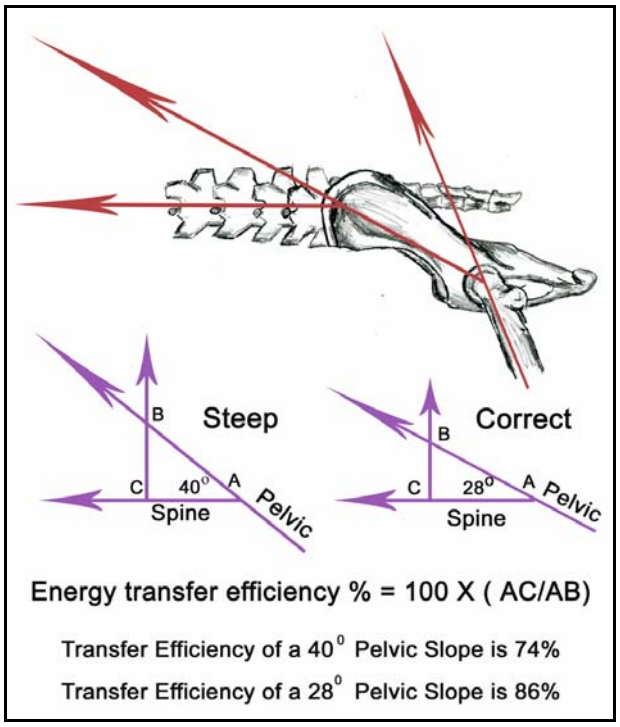
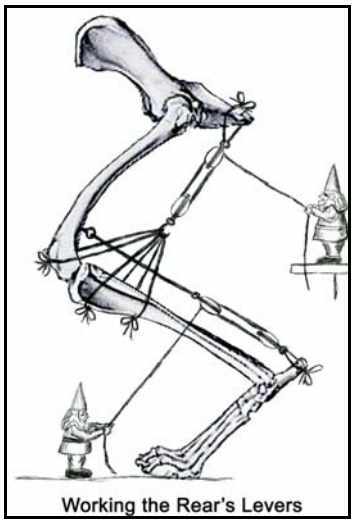
Editor's Note: *Please refer to pages 98-99, Issue 2 of 2010 for Part 1; pages 82-83, Issue 3 of 2010 for Part 2.*

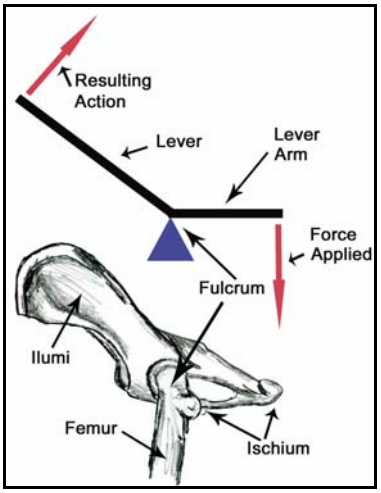


Pelvic Slope's Effect on Energy Transfer:
Energy generated in the rear travels through several different pathways before it reaches the front assembly. Every time the path changes direction, energy is lost. The amount of loss depends on the degree the pathway changes. You can prove this to yourself the next time you push a heavy cart. Instead of pushing directly in the direction the cart is traveling, divert your push at a different angle and notice how much less effectively the cart travels in the intended direction. The amount of energy applied is the same, but the direction it is applied in has changed, and so only a percentage of the original energy applied is diverted in the intended direction. In the above diagram, the red rays depict some of the different pathways energy travels and the changes in direction energy makes on its way to the front assembly. The slope of the pelvic determines the degree energy changes directions and the amount of energy lost. In the blue diagrams, the effects of a steep angled pelvic (40 degrees) and a correctly angulated pelvic (28 degrees) are demonstrated. Segment A to B represents the amount of original energy transferred through the pelvic. It is the same amount for steep and correct diagrams. Segment A to C represents the part of the original energy redirected along the spine. Segment C to B represents the amount of energy lost during the direction change. The percent transfer efficiency of both pelvic slopes is given. The efficiency percentage represents the percent of the original energy applied through the pelvic which was redirected toward the front assembly.


Working the Rear's Levers

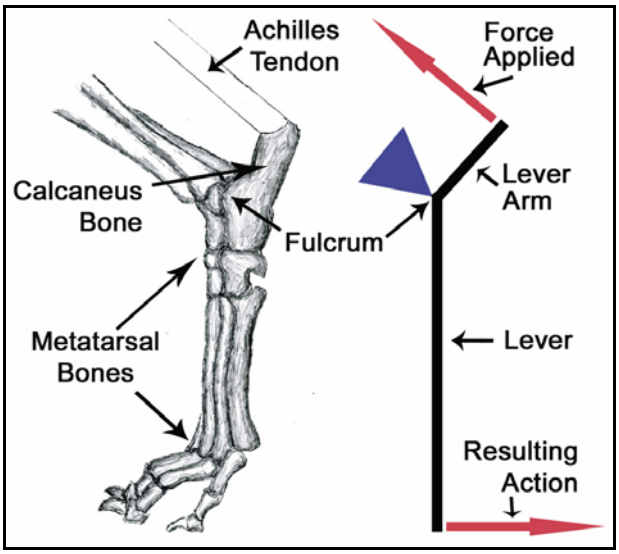
Joints and Levers:
There are three major joints of the rear assembly. Two are levers and one is a hinge. Both the hip joint (where the pelvic and upper thigh join) and the hock joint (where the metatarsus and lower thigh join) are levers. Because they are levers, the laws regarding levers apply to them.

Archimedes' Principle of the Lever
The longer the arm of the lever to which force is applied, the less force needs to be

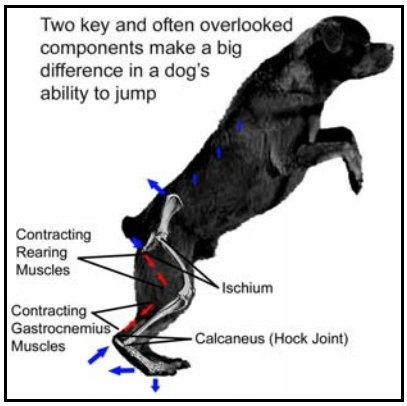


Pelvic as a Lever:
The lever arm of the pelvic is the ischium and the lever arm of the hock is the calcaneus. In phase 1, the rearing muscles attached to the ischium contract, pulling down on the ischium and resulting in the lifting of the ileum, the front part of the pelvic, and in so doing, lifting the spine as well. Because of this, the front is provided some supported by the rear. As stated in Archimedes' Principle of the Lever, the longer the arm of the lever is, the less force needs to be. As the ischium's length increases, the force needed to be applied by the rearing muscles becomes less. The increase in ischium length also increases the capacity of the rearing muscles to generate power. It also increases our Rottweiler's agility and jumping capabilities. As an added bonus, the longer the ischium is, the greater the area for muscle attachment. The size and development of muscles is dependent upon the amount of area there is for attachment. The greater the area for muscle attachment, the more substantial and powerful the muscle becomes.

Call of the Wild:
It is interesting to note how much nature emphasizes the ischium in wild canids. For example, in the wolf the distance from the tip of the ischium to the center of the hip socket represents up to 40% of the total length of their pelvic.

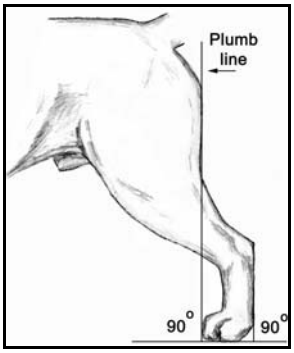


Hock as a Lever:
The hock joint is no different. Often, we talk about the importance of a short hock, but actually there are two important areas of the hock requiring our attention: the metatarsus and the hock joint itself. In the correct hock, the metatarsus is to be as short. This is what the FCI standard means when it states "not steep." The hock joint, the calcaneus, needs to be long and as was stated before, this is the arm of a lever. The longer the calcaneus is, the stronger the hock joint is, and the less force needs to be applied by the Achilles tendon and the gastrocnemius muscle. It is this proportionate length relationship between the metatarsus and the hock joint which determines the efficiency of the hock as a whole. With both the hock and the pelvic, the longer the ischium and calcaneus is, the greater the endurance and power generated will be.

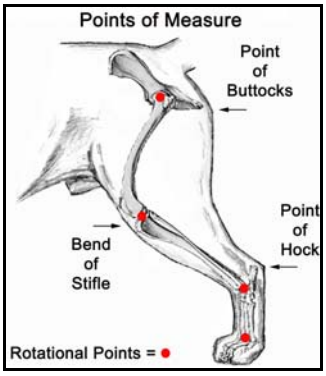


Bone Proportions of the Rear:
Just like everything regarding our Rottweiler, it comes down to having correct proportionate relationship of the parts that creates harmony and efficiency of the whole. Not only do we need to take into account the optimization of the parts, but also how those parts relate to the other parts of our Rottweiler. This is especially true of the rear assembly and it is the proportionate lengths of the pelvic, upper thigh, lower thigh and hock which are of primary importance. The slope and ischium length of the pelvic was discussed earlier, but the overall length of the pelvic was not discussed. At present, no Rottweiler standard specifically addresses the length of the pelvic. It could be assumed since Rottweiler standards state the croup is to be of medium length, it also applies to the pelvic. The problem with this assumption is they are not the same structures. They may be inseparably connected, but they are different. There are short croups attached to longer pelvics and medium croups attached to long pelvics. In this author's opinion, the difference between the croup length and the pelvic length plays a significant part in the set of the tail. The foregoing topic is an article unto itself. So, we will move on the other bone lengths of the rear assembly.

The FCI standard calls for a moderately long upper thigh, a long lower thigh, and not steep hocks. From this, the obvious questions arise. How long is "moderately long"? How long is "long"? How long is "not steep"? Without a system to evaluate the rear, interpretation of the standard can vary greatly. So, years ago a system of evaluating the rear was created.

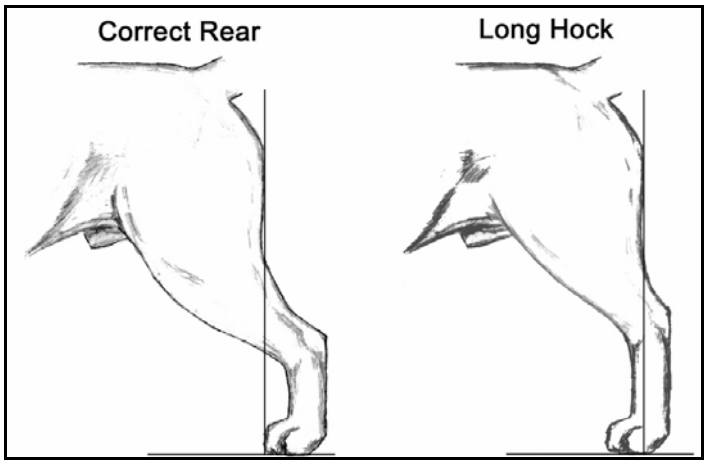


System for Evaluating the Rear's Structure:
In order to use this system, there are some rules which need to be followed. The dog needs to come into his stance naturally on a loose lead without being hand stacked. The key is for the hock to be perpendicular to the ground as much as possible forming a perpendicular, 90 degree angle with the ground. While looking at the dog's side profile, imagine a plumb line drawn from the point of the buttocks to the ground and perpendicular to the ground. If using an actual photo, you can draw an actual line. If the hock is perpendicular to the ground, in a well structured rear assembly, the line should contact the ground just in front of the rear toes.



Measuring Points versus Rotation Points:
The point of the buttocks, point of the knee and point of the hock are all measuring points used to measure the length of the upper thigh, lower thigh, and hock. Descriptions in breed standards are based upon these measuring points because they are most easily referenced or located on the dog. However, they do not represent the actual joints of the rear assembly.

Rotation points are the actual points in the rear where flexing occurs and the distance between them coincides more accurately with the true length of the rear's bones. When studying the mechanics of the rear, the rotation points are of primary importance. In a correct rear, the distance between the rotational points indicates the bones of the upper and lower thigh are approximately of equal length.



In my next article, we will continue with discussions and diagrams from where I left off on this article. If anyone would like further information on anything discussed above, please post your questions and/or comments on the magazine's forum and I will be happy to discuss this in greater detail.

Steven Robinson & Hoover