

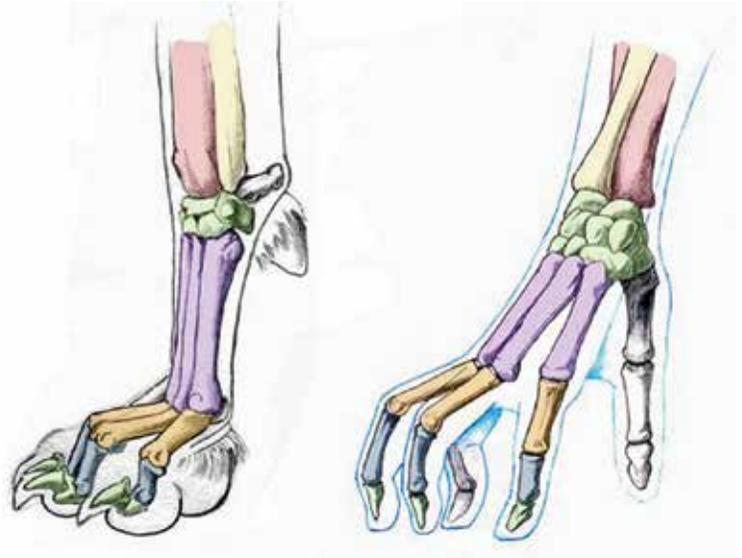
The Foot

By Dan Buchwald

The Boxer standard, as well as those of many other breeds, calls for a “cat foot.” This means a foot that has well arched toes sitting closely to each other with well cushioned pads. The canine foot is a fascinating multifunctional structure. Here are some dog foot facts.

Dogs are digitigrade animals; this means that the weight-bearing surfaces of their limbs are their digits.

To the right is an image showing the correlation between the bones on the foot and pastern of a canine to the human hand. Notice that the human wrist and hand correlate to the dog’s pasterns and our fingers to their toes. Angles and arches have the physical properties of attenuating and redistributing weights and forces applied on such structures. Well arched toes are not merely cosmetic requirements but a classic example of form following function.

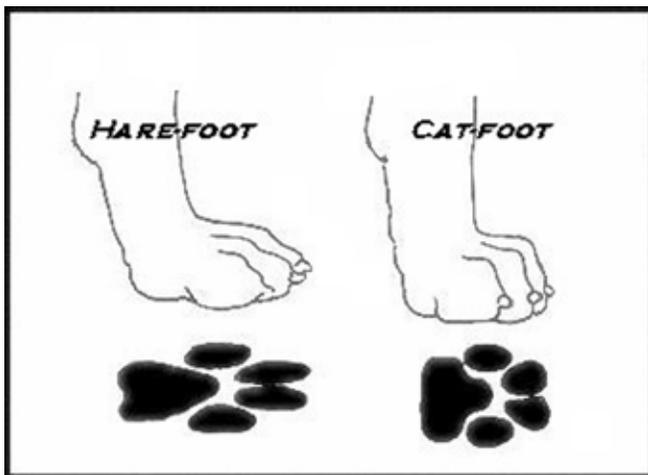


There are four important factors that help determine a “cat foot” in dogs. The length of the bones, the tightness of tendons and muscles associated with the foot and pastern, a well cushioned pad support, and temperament.

1) **BONE LENGTH:** Like other bones in the dog’s body a variation in the length of the bones forming the toes (phalanges) is a common occurrence. Shorter bones are typically related to “cat foot” while longer bones will often determine a “hare foot” such as seen in German Shepherd Dogs. Since this variation is genetic in nature, very little can be done to change the resulting foot shape as determined by the length of those bones other than selective breeding.

2) **MUSCLES AND TENDONS:** Muscles and tendons that hold the foot bones together have a great impact on the foot’s shape. Breeders will often observe that growing puppies in the so-called gangly stage will have flattened feet. As age increases and general muscle tone improves, the foot shape gets significantly tighter. This is not a reason to over exercise puppies but is an important caveat when evaluating younger dogs.

3) **PADS:** The pad is characterized by rough, often pigmented, keratinized, hairless skin covering subcutaneous collagen fibers and fatty tissues. These pads act as a cushions for the load-bearing limbs. The paw consists of the large, heart-shaped metacarpal or palmar pad (in the forelimb) or metatarsal or plantar pad (rear limb), and four load-bearing digital pads. A carpal pad is also found on the forelimb (dewclaw) which is used for additional traction when stopping or descending a



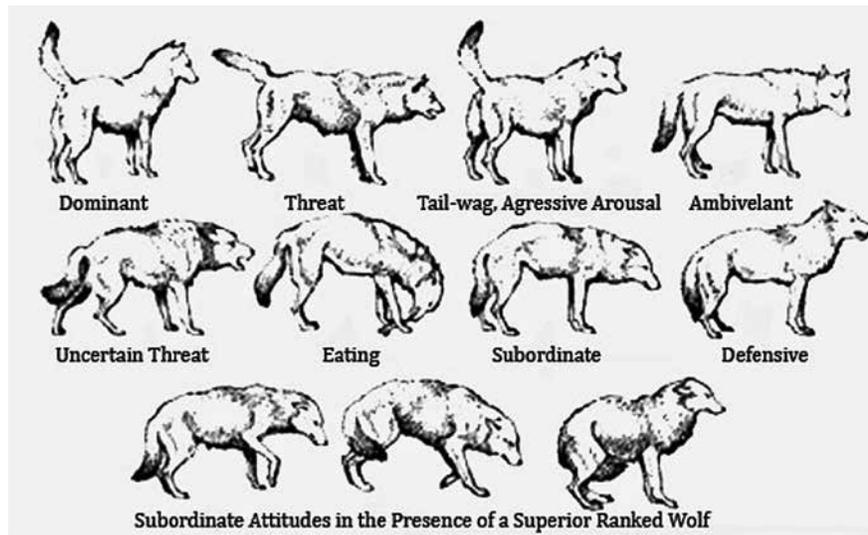
slope. Additional dewclaws can also be present in some breeds. Dogs exposed to rough terrains will develop a thicker skin on their pads due to extra production of keratin. This is easily seen when comparing the pads of dogs who often use cement runs for exercising as opposed to dogs who spend the vast majority of their time on a couch.

4) **TEMPERAMENT:** Temperament can and does affect the shape of a dog’s foot. It is always important to keep sight of

the big picture and see how separate issues interact with each other and to understand how of such interactions express themselves.

Changes in emotional states cause changes in heart rate and body temperature. Although the major form of thermal regulation in dogs is through panting (as opposed to other species like humans who greatly rely on sweat gland to lower body temperature), dogs do have sweat glands in their pads. Dogs perspire through their pads and they have scent glands on the bottoms of their feet that allow them leave a mark that can be seen and sensed by other animals.

Research has shown us that animals that have sweat glands in their paws tend to sweat when they are running. It is thought that the purpose of the sweat is to provide traction on a variety of surfaces, allowing the dog to run faster. This



may be why dogs tend to activate their paw sweat glands when they are at the vet’s office. They want to leave the building and they’re ready to run through any open exit to get there. The sweating paws are the dog’s body’s way of preparing for an escape.

During the fight or flight process, or under other kinds of stresses, dogs will sweat through their paws. During such situations the arched toes will loosen a little and allow for a greater area of the pads to be in contact with the ground. Therefore, a trend can be established where shy or submissive dogs as well as puppies recuperating from post ear crop procedure will show a flatter foot.

As the dog’s conditioning allows for added self-assurance (dog gets familiar with its surroundings or perceived threats are removed from the picture) or as the ears heal from cropping and discomfort diminishes, the feet will show a more noticeable arch to their toes. It’s a simple correlation where temperament alters posture and consequently impacts foot shape. Flat feet in Boxers is far more common among dogs of shy/submissive temperaments.

Another noteworthy structure of the dog’s foot is the toenail. This keratin structure covers a highly vascularized and enervated area also known as the germinative layer more commonly referred to as the quick. Frequent toenail care with gradual cutting or grinding will cause a retraction of the quick. If the toenail is cut too short there will be profuse bleeding and pain – certainly many dog people have experienced how challenging nail maintenance can be.

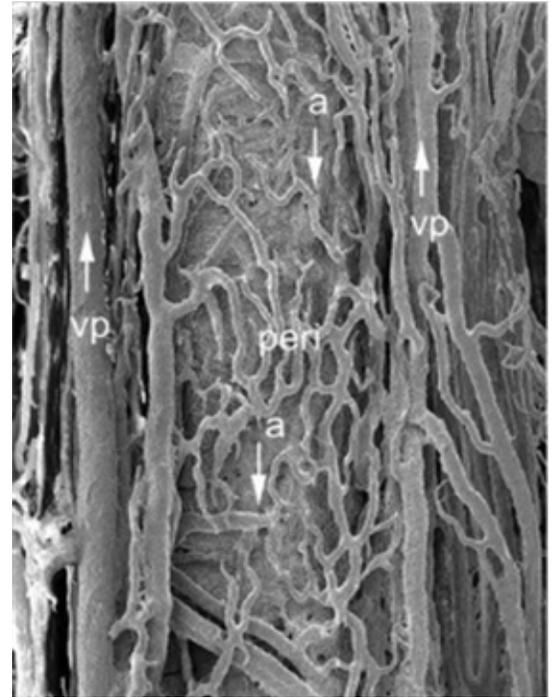
There is a very informative video by behavior expert Dr. Sophia Yin, DVM, MS on the internet showing how to handle and revert aggressiveness of dogs during the “pedicure” process. It can be found by using the address below or by an internet search on Dr. Sophia Yin’s videos. http://drsophiayin.com/videos/entry/training_a_dog_to_enjoy_toenail_trims

Some dogs may have a very well developed membrane between their toes that allow them extra efficiency while swimming. Those are called webbed toes and are commonly found in the Newfoundlands, among other breeds.

Since there are so many fascinating aspects to the dog’s foot, I’d like to take this opportunity to share yet another specialization of its anatomy. Have you ever wondered, during winter months, how dogs are able to stand and play on frigid, snow covered

grounds for extended periods of time and not freeze? Dogs have a very specific artery/vein structure in their feet called
“Countercurrent Heat Exchanger.”

Countercurrent Heat Exchanger: In the dog paw pad, the veins surround an artery and run parallel so that the arterial blood flows into the pad surface in the opposite direction to the venous blood flowing out. Such a system establishes a constant temperature gradient between arteries and veins and makes an effective countercurrent heat exchanger. The warm arterial blood transfers its heat by simple conduction to the adjacent cool venous blood. In this way, blood-borne heat is re-circulated back to the body core through the venous blood prior to losing heat to the environment. If a foot pad with a countercurrent heat exchanger is in a warm environment, the blood in that pad will be warm and the countercurrent heat exchanger will have little effect. When the foot pad is exposed to a cold environment, blood flow increases in the legs through regulated vasodilation in the foot pad. This means that the dog has a warm body and cold paws during exposure to cold. Ice doesn't stick to cold paws.



Penguins mostly live in the extremely cold Antarctic and whales and seals can swim in freezing water in the Arctic seas. These animals also have countercurrent heat exchange networks in the feet, fins, and flippers, respectively, to avoid losing their body heat.

In conclusion, the dog's foot is an amazing structure that not only serves as a crucial means of support and locomotion, it is also associated with several other parts of the dog's body and its emotions. In evaluating the dog's foot, we are reminded once again to keep an eye on the big picture and be aware of how the different body parts and functions interact with each other.



About the author:

Dan Buchwald is a graduate of the School of Veterinary Medicine, University of Sao Paulo, Brazil. Along with his mother Agnes Buchwald and family, he founded the internationally famed Hexastar Kennels in 1973. Over 150 Boxer champions have been finished under the Hexastar banner. Of those, more than twenty attained International FCI championships and six others American AKC championships. Dan obtained his Brazilian Kennel Club's all-breeds judge's license in 1988; the youngest ever at that time to attain those credentials. His assignments have taken him all over South America and into the United States. In '89 at the Kennel Review's Invitational Tournament of Champions; in '91, he judged at the New Jersey Boxer Club (dogs and intersex competition), So. New York Beagle Club at Westchester K.C., Trenton K.C. (Toy Group), Sussex Hills K.C. (Sporting Group), and the New Brunswick K.C. (Herd- ing Group). He has also judged numerous sweepstakes, as well as the Futurity at the American Boxer Club twice.

Since moving to America over 20 years ago, Dan has pursued a successful career in professional handling and started selectively breeding Boxers while mentoring other co-owners under the Avalon kennel name. Even though retired from actively breeding, Dan takes huge pride of being the breeder of the first ever Boxer to go WB/BOW from the BBE class at the American Boxer Club National.

Dan is the author and illustrator of The Boxer Blueprint. He is an award-winning sculptor and is the illustrator for The Brazilian Kennel Club Official Book of Standards and the Brazilian Kennel Club Conformation Book for Judges. As a speaker, he has presented seminars to the Connecticut Dog Judges Association, Princeton Dog Judges Association, New Jersey Boxer Club, and Sacramento Valley Boxer Club as well as to the Cotswold Boxer Club and Whales Boxer Club in the UK. He has been a repeated guest speaker at several judges and breeders seminars at the American Boxer Club Nationals and other parent clubs abroad. He is the author of many articles in the late Boxer Review, Dog News, Showsight, and the Canine Chronicle as well as several dog magazines abroad.