Form Follows FUNCTION

BY STEPHANIE HEDGEPATH

THE CANINE NECK

Figure 1: The Seven Cervical Vertebrae

Short neck, long neck—all dogs have the same neck, right? That is true only in that all dogs (and almost all mammals) have seven cervical vertebrae that comprise the neck (see Figure 1).

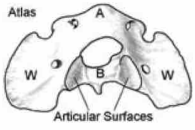
Knowing that every dog has the same number of vertebrae, we also know that standards for individual breeds call for a variety of neck lengths and thicknesses. A few examples are as follows: Italian Greyhound—"Neck: Long, slender and gracefully arched." (See Figure 2.); Golden Retriever—"Neck: medium long, merging gradually into well laid back shoulders, giving sturdy, muscular appearance. (See Figure 3.); American Staffordshire Terrier—"Neck: Heavy, slightly arched, tapering from shoulders to back of skull. No looseness of skin. Medium length." (See Figure 4.); Bulldog—"Neck: The neck should be short, very thick, deep and strong and well arched at the back." (See Figure 5.)

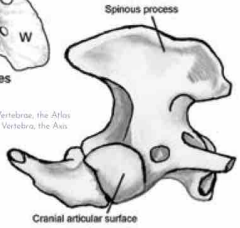
Figure 2: Long Neck

Figure 3: Medium Long Neck

Figure 4: Medium Length Neck

Figure 5: Short Neck





pictured above: Figure 6. First Cervical Vertebrae, the Atlas
pictured right: Figure 7. Second Cervical Vertebra, the Axis

> *PAIRED WITH THE ATLAS' 'YES' MOVEMENT, the Axis is called the 'No' joint of the skull.*

The most obvious purpose of the neck is to support and allow for the movement of the head. The vertebrae also protect the spinal cord, starting with the cervical vertebrae. But there is much more going on with the neck than the eye can see. Let us take a closer look at the dog's neck.

The neck has two specialized vertebrae: the Atlas and the Axis. The Atlas is the first cervical vertebra. It has a small body (B) with two wings (W—transverse processes). The Atlas articulates (see Figure 6) with the head at the occiput (see Figure 1) and is responsible for the up-and-down movement of the skull on the neck, often called the "Yes" movement or "Yes" joint.

The second cervical vertebra is the Axis, which provides the side-to-side and rotary motion of the skull. Paired with the Atlas' "Yes" movement, the Axis is called the "No" joint of the skull (see Figure 7).

The articulation of the Axis (darker vertebra) with the Atlas (light vertebra) provides for the movement of the skull (see Figure 8).

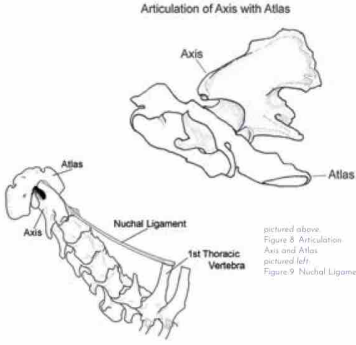
The neck is held up by a cervical ligament (nuchal) that extends from the spinous process of the axis to the withers at the first thoracic vertebra. This ligament is unusual in that it can both contract and expand. It contracts to pull the neck up and relaxes to allow the head to be lowered. Ligaments attach bone to bone, whereas tendons attach muscle to bone. Muscles pull the tendons and tendons pull the bones (see Figure 9). The nuchal ligament is a strong influence on the form of the topline of the neck.

The most powerful muscle of the neck is the brachiocephalicus muscle, which reaches from the neck to just below the shoulder joint where it attaches at the upper arm. This muscle activates the movement of the shoulder blade. Other smaller muscles extend from the shoulder blades to the vertebrae of the neck (see Figure 10).

Muscles produce movement only when they contract. Muscles are almost always arranged in opposing groups that perform opposite actions on any given joint. Dogs with a high head carriage (Poodles, Afghan Hounds and Min-Pins immediately come to mind) are those in which the neck muscles are tightened due to the head carriage, pulling the leg forward and higher, resulting in a springy or prancing gait. The higher head position leads to even more lift to the front feet when in motion—correct movement in these breeds.

In most breeds, the length of the neck and the length of the head are approximately the same (see Figure 11). Since the shoulder blade muscles are attached to the neck, an arched neck (like an arched doorway) is structurally stronger and is better at withstanding the pulling forces generated from the shoulder blade muscles.

A "ewe neck" lacks this arch, and the circumference where the neck joins the body is about the same as at the head (see Figure 12). The ewe neck has no arch at the crest of the neck and is concave, plus the neck is rather abruptly joined to



pictured above: Figure 8. Articulation Axis and Atlas
pictured left: Figure 9. Nuchal Ligament

pictured far left: Figure 10. Brachiocephalicus Muscle
pictured left: Figure 11. Correct Length of Neck on a Pointer

> *DOGS WITH CORRECT LENGTH OF NECK USUALLY HAVE WELL LAID-BACK SHOULDER BLADES.*
> *A short-necked dog is often one that has an upright shoulder assembly, with the shoulder blade placed forward on the body.*

the body in front of the shoulder blade instead of flowing smoothly into the withers. The front of the neck arches out (convex curve) instead of a slight, graceful curve inward, following the arch of the neck and then leading down to the prosternum.

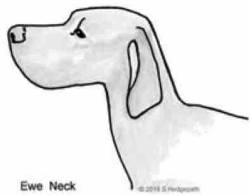
Dogs with correct length of neck usually have well laid-back shoulder blades (see Figure 10). A short-necked dog is often one that has an upright shoulder assembly, with the shoulder blade placed forward on the body. This tends to cover up the lower part of the neck and gives the dog a stuffy appearance with a shorter appearing length of neck showing between the head and the shoulder blade. The short neck hinders the dog in that there is less area for muscle attachment. The short-necked dog also has a tendency to lower its head [when] in motion in order to attain reach (see Figure 13).

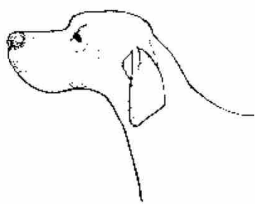
A too long neck (swan neck), as well as a stovepipe neck, has some of the same problems as a ewe neck in that the circumference of the base of the neck is approximately the same as at the throatlatch at the top of the neck. A long, thin, arched neck is often termed a goose neck or a swan neck (see Figure 14). A neck that is too long is usually lacking in strength and spoils the profile of the dog. A stovepipe neck is joined to the body rather abruptly forming nearly a right angle at the juncture. The resulting weakened neck muscles—in all of these aberrations—often leads to injury.

Finally, we come to those breeds that call for a very muscular, heavy, thick, and sometimes short neck (often termed a "Bull" neck) as found on the "Bully" breeds as well as on the Bulldog, French Bulldog and Pug. This neck is required of a dog that had to have more neck strength in order to control livestock or kill vermin. [Although] a fault in other breeds, it is a virtue in the breeds mentioned (see Figure 5).

In summary, the neck can be compared to the boom of a crane. The neck (crane) can be raised, lowered, extended, retracted and swerved laterally by muscles that originate in the area of the withers and have ends on the various spires of the cervical vertebrae. Overlapping long muscles also originate on the upper neck and fasten themselves onto the upper arms to carry or lift them for forward reach, and also to provide the lift and stretching necessary for movement of the head. The junction of the first two cervical vertebrae, the Atlas (#1) and the Axis (#2), is similar to a ball and socket joint that allows for more flexible motion (up-and-down, laterally, plus rotation) of the head. The area between the second (Axis) and third cervical vertebrae is called the "pole" and this is where there is a noticeable change in the curvature of the neck.

Therefore, the answer to the initial question is "Yes." The neck of any dog is comprised of seven cervical vertebrae. However, because the individual cervical vertebrae can differ in length, there can be a wide difference in the length of neck from breed to breed. Even a giraffe has seven cervical vertebrae (though they are very elongated), the same number found in human necks.





pictured top to bottom:
Figure 12. Ewe Neck, Figure 13. Short Neck, and Figure 14. Swan Neck