

## **What type construction guarantees stamina in the German Shepherd Dog**

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The dog has three basic types of movement; walk, trot and the gallop. The amble can take place during the walk and trot. Although ambling enhances stamina, it is not a true type movement. In proportion our dog will walk less than it will trot.

The fastest type of movement, the gallop will with free living wild dogs play a less important role. The closest ancestors of our dogs namely the jackal, hyena and the kojote manage the large distances with stamina and not with speed. For them the trot is most important type of movement. It is not that easy for a wolf size-hunting animal to find adequate food in a few square kilometers and therefore it has to frequently cover distances of 100 km in one night.

The German Shepherd Dog has, up to now retained the most genuine construction of its ancestors, the trotter construction, which has been in many respects further perfected through systematic breeding and is the beautiful shape of a construction aimed at economy, even more so when think of its multi purpose utilization.

The breed standard for instance calls for the construction of a non-tiring tritter which, with the least amount of effort delivers the highest degree of performance. Stephantiz describes this concept: "as the economy of power".

Now I would like to mention some important factors, which enhance the stamina of the German Shepherd Dog and for simplicity, they are in the sequence of judging.

Firstly, in general, some remarks regarding the locomotive mechanism of the dog.

This comprises:

The passive locomotion mechanism, which comprises the bones and the joint ligaments. It supports the organism and creates its shape. The active locomotion mechanism, which consists of muscles of the skeleton and its tendons. It makes the deliberate body movement possible. On the one hand, the muscles are designed for quick, instant action and on the other hand, they are also equipped to cope with enduring work resulting in overall balanced and supple movement which should save energy.

It is therefore necessary that the skeleton provides for the correct position of the limbs as well as the movement of joints and that it incorporates large levers in order to save muscles energy. For example, the longer the levers whilst within the breed standard, to which the muscles are attached and the better the angulations of these limbs, the higher one should rate (in theory) the working ability of the dog.

In the same way as the passive and active locomotive mechanism compliment each other, the overall picture of our dog should be balanced e.g., each body part should be in the proportion to the total body complex. When all individual parts and also the support columns (legs) fit together in an evenly manner one can say, "a thoughtful and purposeful constructed body on the basis of harmony and symmetry guarantees the best development of power and stamina".

Exercise and work require a determined measure of size and strength.

With an increased height the body weight increases considerably and requires more from the muscles to the detriment of muscle power available for movement. The body height therefore has a negative effect on the performance. Dogs that are too large and too heavy carry too much dead weight. They stop, climb and jump poorly. In addition, they are often less keen to work as they tire too soon. The performance will be even more affected when the additional height is caused by "upright movement" as a result of poor front and hind angulations, the forereach will be binding and the length of stride will be restricted. With an incorrect chest construction there is too little space for the internal organs and under stamina the performance will visibly suffer. A dog, which is too small, even when it is well proportioned, lacks strength. Although fast and agile, it is too light in construction and possesses too little stamina. When such animals additionally have legs that are too short, the chest will be very deep, and their movement will cover too little ground.

Only the German Shepherd dog of a good medium size 63 cm for males and 58 cm for bitches measured at the withers can count on agility, speed and especially stamina.

The correct size working dog requires the correct strength in the bones and muscles. The outer shape of our dog depends more on the positioning, size and shape of the bones, than anything else. They are extremely well equipped to pass on the forwards thrust during movement.

The elasticity of the bone tissue constitutes 85% of that of iron, and yet the weight of bones, is only one third of the weight of iron.

The surface of the bones may be smooth and even or be uneven and shows pronounced grooves, which serve to anchor muscles, ligaments and tendons. The bones should be dry and not be coarse or spongy and certainly not too fine.

Bones that are too large reduce stamina as the dog carries too much dead weight.

According to "Klatt", muscles constitute 53% of the total weight and this, amongst others, creates his working ability and his overall appearance.

The muscles, of which the length and width are determined by the anchor point position on the bones, should be dry and firm and so should be the tendons and ligaments which keep the skeleton parts together, especially those at the joints. As our dog is not a heavy duty animal, the lever lift power of the muscle reduces at the height of leverage, that is the length to which the muscle shortens is greater than the lever arch, which in turn is also dependent on the length of the muscle strands. As a result of muscle contraction, the various connected skeleton parts make movements which can be compared with levers and in general skeleton movements are based on the principles of the leverage.

We can therefore state "Not the thick, but the long muscles are favorable for stamina".

When we refer to the proportion of the dog, we refer to the ratio of height to length. With the correct height to length ratio all parts are in natural balance, which is maintained in stance and in movement and requires no undue muscle action.

The optimal proportioned German Shepherd Dog, possess a slightly stretched trotter's construction of which the length exceeds the height at the withers. According to "Stroße" is the ratio of 10:9 is the best for balance and stability as well as movement and therefore stamina.

The head best expresses the type of breed, sex characteristics and character of a dog. Ear carriage, the expression in the eyes, condition of the coat and pigmentation further provides clues to the health, condition and temperament. The manner, in which the dog moves and behaves, should indicate that there is a healthy mind in a healthy body. All these factors are links in a chain and are the physical and mental conditions required for lasting stamina. And now let us expand on those three body components that determine the degree of power: namely the hind thrust, the transfer over the back and the forereach.

The back has the role to transfer the power generated by the hindquarter action. Only a firm back can form an effective bridge type connection between the hind and forequarters. It comprises the withers, the true back and the loin. The withers are at the front part of the back. The back and shoulder muscles are connected to first dorsal vertebrae, therefore high and long withers do not only enhance the development of strong muscles which create firm shoulder joints, but also provide broad and an angulated coupling for the shoulders, a good reach stamina.

The thrust generated by the hindquarters is wasted in an upward or downward direction with a raised or hollow back. Therefore, only the foregoing referred to type back can enhance stamina. Whilst we require length of withers, the loin part (7 vertebrae) should not be too long, but strong and wide. A short and stiff loin is beneficial for stamina. The pelvic bone, together with the muscles and the cost, form the croup. It is an essential part of the hindquarters and is extremely important for stamina.

The pelvic bone should, like the shoulder blade, be long and diagonally placed. A steep, or a too short pelvic bone, reduces the stride as the back legs will be too far under the body and the thrust generated by the hindquarters will be wasted in an upward direction. When the pelvic bone is placed (+/-45° to the horizontal) the croup will be long and slightly sloping. It commences almost straight and then slopes into a slight arch (+/-23°) downwards. In this way there will also be sufficient space for long and strong muscles, a pre-requisite for powerful and especially enduring hindquarter action.

With a flat croup the tail set will be high and the tail is also frequently badly carried. Poor tail carriage disturbs the top line and handicaps the dog during forward and sideward movements because it serves as a rudder and, when required, as a brake. Even this incorrectness affects stamina. A strong dog should therefore have a powerful, well muscled in all directions, slightly flexible tail which ends approximately at the point of hock.

At the beginning I have already mentioned that, in a symmetrically constructed German Shepherd dog, all parts including the (legs) fit together in such manner that. The highest performance can be achieved. Therefore powerful hindquarters should have matching well-constructed forequarters, which can absorb the moving mass and complete the movement cycle which started at the back. The firm connection between the legs and body is provided by the shoulder blade. Connected to it are very powerful muscles that can move it and the upper arm.

The angle of the shoulder blade should be 45° in relation to a horizontal line. According to "Solara", the shoulder blade is a flat triangular bone, which is positioned towards the front and on the outside of the ribcage at an angle from the top to the bottom and from the back to the front. It can perform several movements: forwards and up and down, inwards and outwards the shoulder blade should be long and well-developed, so that plenty of space is available for long muscles. It is only kept in position by muscle action by those muscles, which start at the neck, the back and the ribs

and which are attached to various on the shoulder blade. Therefore high withers as already mentioned enhance powerful muscles which keep the forehand together.

With flat withers these muscles are less developed and the shoulder blade will be pushed upwards especially during movement. The effectiveness of these muscles will be the greatest the more perpendicular the tendons and the line through which the muscles generate its power is in relation to the bone segment operate.

As the angle of the shoulder blade is also to some extent influenced by the roundness of. The first four ribs, the ribcage also influences the shoulder angle, as the shoulder blade at the bottom deviates about 10 to 15° from a vertical line. Strongly developed ribs and the correct deepness of fore-chest of which a good piece is visible from the side are the prerequisites for a well-laid shoulder blade. The reach of the fore –step is very much influenced by a well laid shoulder blade which can, to some extent compensate for a short and steep upper arm and the dog still shows good forereach. The static function of the limbs however is disturbed and the animal, under prolonged exercise, will show signs of tiring.

Again, it becomes clear that in the end it is the harmonious togetherness of individual components that result in the stamina of the German dog.

The shoulder blade should be at a right angle to the upper arm. The ideal angle, which hardly exists (it is mostly somewhat larger (115 degrees), requires that the shoulder blade and upper arm should be approximately of equal length. This angle allows for a wide opening, which in turn results in far reach. The long and diagonally positioned upper arm moves the elbows and front legs further backward under the body. Here again we find the reason why, with good angulations of the shoulder blade and upper arm, together with the correct depth of chest, we should see a good piece of fore-chest when viewed from the side. Incorrect length and position of the upper arm shortens with certainty the forward reach.

The solid red line indicates the restricted forward reach caused by poor front angulations. By comparison the broken red line shows the reach resulting from excellent angulation.)

Here we have the most different deviations, partially coupled to the incorrect position of the shoulder blade.

A short and steep upper arm does for instance not necessarily indicate that there must also be a short and steep shoulder blade. Frequently, animals with a short and or steep upper arm, mostly those that are well handled in the show ring show seemingly good forereach. On observation, one notices however that the apparent reach is fictitious, as the point at which the feet touch the ground determines the reach. Under prolonged movement, the forereach becomes increasingly shorter. The point of gravity moves forward in a downwards direction and the dog falls on the forehand as the strong stretching of the front legs in an upwards direction in order to correct the downwards line of propulsion comes too late, due to the restricted front stride the body is too far forward and the corrective upswing of the foreleg comes too.

I have mentioned that a well laid shoulder blade can to a degree compensate for a short upper arm, although it will be at the expense of stamina as the lowering of the point of gravity requires the dog to use more power to move its front legs forward. So, again, the correct position and length of the upper arm clearly shows the impact on stamina.

The movement commences at the hindquarters. A dog, with slightly backward placed legs, is the natural and therefore the most balanced German shepherd. A drop line from the "pubis" or "sitting bone" should touch the ground approximately at a one finger width in front of the foot with a perpendicular (90°) placed hock. This stance points to a correctly proportioned length of about 50/50 of the thighbone and stifle that is the thighbone and stifle are almost equal in length and correctly angled. An angle of near 90°, it is nearer to 120 degrees is in theory the best for fast and on going movement as only then can long muscles with a strong contraction be attached.

Slightly backward placed legs ensure a firm stance and a thrust from the hindquarters which, once more, is to the benefit of stamina. Every tendency towards over-angulation reduces the overall firmness and the static function and as the muscles perform their action at too much of a tangent in relation to the segment of the bone to which they are connected they are under too much duress and thus in turn the stamina is effected.

The hindquarters comprise the pelvic bone, thighbone, stifles, metatarsus and the skeleton bones of the feet; these are connected via the hip, knee and hock joints. The thighbone is at the top connected by the head of femur in the socket of the pelvic bone and at the bottom to the knee joint. The "hock" joint connects to the strong metatarsus, the fibia and the toe bones. The head of the femur is, likewise the hock exposed to great pressure and should be strongly developed, and this also applies to the knee joint, which starts and passes on the forward movement. The knee joint is the most important joint in the dog. Its correct position depends on the length of the thighbone and a good hind angulations as well as the length and the angle of the croup. Strong joints are a prerequisite for straight and even more so on going movement. (the solid red line depicts the resultant direction of the various thrust lines generated by the hindquarters)

A further criterion, which is measured during the breed survey, is the chest depth to height ratio. This should not exceed more than half the height at the withers; 45-47% is the correct measurement.

A non-tiring trotter must have strongly developed inner organs like the heart and lungs. A well-developed chest space provides for these.

We talk about the fore and under-chest. With the fore-chest we mean that portion which runs from the throat to where the front legs start.

A well-constructed German shepherd dog shows a good piece of fore-chest. This points at an well-angulated and positioned shoulder. The combination of these parts results in the desired far-reaching stride. The under-chest connects to the fore-chest and slopes gradually upwards.

The ribcage is made up to 9 pairs of real ribs joined together by the chest bone and four false ribs, connected through cartilage and the last pair is often not connected ("floating"). The further set back last the pair is the better the width of the ribs, on which the respiration and again the stamina depends.

Especially in recent years, the fronts of our German shepherd dogs have been criticized. This is certainly a problem to be addressed by our breeders in the future. A correct front seen from the front and from the side with straight, strong and long legs together with a fitting width of chest and completely closed elbows is from nature advantageous for movement and again the stamina.

The elbows should form a firm connection between the upper and lower arm and should not bend outwards under pressure. Broad chested dogs are this way inclined. The turning out of the elbow joints is a serious working dog failure as it is almost always caused by a weakness of the ligaments.

Under these conditions the muscles are now forced to return the elbows to the body and this greatly reduces stamina.

Turned in elbows is also an indication of limited working capability as the body should not be suspended on the front legs but should rather hang in between the legs.

Poor chest, especially front chest construction also restricts elbow connection. The shortened chest bone offers the chest muscles, which start there and keep the upper arm close to the ribcage, insufficient space for anchorage. They will develop poorly and will as a result of the increased distance of the upper arm be strained, as they have to return the elbows to the chest with effort, which again is to the detriment of stamina.

The pastern, seen from the side, should be at an angle of approximately 20° from extended line through the lower front leg. It should have a fitting length and have fitting firmness. A dog with a steep pastern cannot absorb the impact of the front leg; with weak pasterns the dog will stumble. Both incorrect types pastern influence stamina, as the animals get tired earlier.

The feet of the German shepherd dog are round, arched and closed. The pads should be strong and hard and the nails should be short and strong. Flat feet with long toes influence stamina as these cannot absorb the impact.

Legs, which move close to the ground, parallel in the forward direction, flighty and cover ground, without wasting one centimeter, clearly enhance effortless movement.

When a dog produces far reaching fore-step in correct proportion to a powerful hind thrust whilst the feet move flat forwards without wasting muscles power and without high-lifting the front legs, it will be to the credit of stamina.

In summary, one can conclude that a German Shepherd dog, which possesses the above – described blueprint for construction in all completeness and harmony it, will perform enduring work. Additionally it requires the drive and will to perform. This will compensate for small construction faults, the best-constructed dog means nothing however when the motivation to give his last is absent.

It is for this reason that our breeders whilst preserving bloodlines, continue to strive for perfecting the construction and the willpower our Shepherd dogs to such an extent that our dogs can be exposed with the least possible effect to large tasks requiring much strain and stamina References: W. Trox, E. Orschler, Dr. Gorrieri and Bonetti, Dr. Wilhelm Wegner, Mcdowell Lyon and various articles in the SV Zeitung.