

Dashboard – the Standard – selection of subjects



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Beginning of the breed (before 1890)



Herding Dogs from southern and middle Germany are of a long lasting tradition.

Assessments of the anatomy or even shows and trials had most likely not been conducted in the early days.

Selection was based on the utilitarian qualities of dogs which were known for their qualities working the herd and therefore have been used for breeding.

In 1859 the English ran the first dog shows for all breeds. From there the dog sport spread throughout Europe.

In Germany the beginnings were in 1863. The first dog show was held as part of an agricultural show.

Herding dogs have been presented on dog shows much later.

Already in 1891 the founding of a Shepherd dog club named „Phylax“ failed after a few month. Within this club breeders had agreed to breed „Luxury dogs“.

With the foundation of the „Verein für Deutsche Schäferhunde“ in 1899, finally the corner stone was laid for our breed.

Diverse Herding Dog Strains



There were many different types of conformation, size and coat variety

At that time the breeding pool had no unity as a breed.



Double Coated Shepherd Dog ,
"Württemberg Working breed"
sables (gray color) *shaded overlay*
light tan -sable marking



Double coated Shepherd Dog
"Thüringer Working Breed"
red-tan, *shaded*, tan marking



Long double coated Shepherd,
Herding dog
"Middle German"
black, light tan marking



Double coated Shepherd Dog
"Braunschweig"
Tiger harlequin, black patches on
grey base, white markings



tuft hair coated (shaggy coated)
Shepherd,
"Süddeutschland"
"so called "Old German"
(Ruß v. d. Krone, 241)



Double coated Shepherd,
"Norddeutschland"
white dog
(Berno v. d. Seewiese, 43629)

The breed's characteristics (standard) were laid down on September 20. 1899

The breed standard



Coat: The ideal dog has a double coat of medium length. The outer coat should be as dense as possible, hair straight, harsh and lying close to the body. A slightly wavy outer coat, often of wiry texture, is permissible. The head, including the inner ear and foreface, and the legs and paws are covered with short hair, and the neck with longer and thicker hair. The rear of the frontlegs and hindlegs has somewhat longer hair extending to the pastern and hock, respectively. Faults in coat include soft, silky, too long outer coat, woolly, curly and open coat. Lacking woolly undercoat.

For many breeds an ideal and a visionary appearance were defined. For working dog breeds the physical structure was based on the intended purpose. It was often tried to breed dogs with distinctive characteristics of conformation. Purebreeding dogs followed the model of the much older equestrian sport, horse breeding. Here there was a wealth of experience which most of the dog-breeders as yet could not even imagine. The anatomy was top priority, the knowledge of the animal's physical construction. Horses, having been trained and tested through the centuries in all of gaits and performances, proved that only a harmoniously constructed body can show first class performance. Also, it appeared that the harmonious body is always beautiful. From such considerations, soon arose the knowledge, which characteristics dogs had to be bred for.

The standardization of typical and individual physical construction and properties of temperament and character have been achieved through setting up the breed standard.

The breed standard and further actions



At that time there had not yet been much research on the mendelian law.

During the conformation shows the general public should be shown the breeding goal as defined in the breed standard.

Once a year the best male and the best female have been singled out in a special show and were awarded the title „Sieger“/“Siegerin“.

It was assumed that from beautiful dogs – „beautiful“ also in the sense of „good“– derive beautiful, respectively good progeny.

This assumption was not wrong either, for a well formed animal can as a rule, only develop into such, if it has the corresponding hereditary predisposition.

From this point of view awarding the title „Sieger“ was correct.

No doubt, the „Sieger“ title brought high idealistic and materialistic motivation for the breeder.

Beyond dispute, the fast progress in improving the conformation can be credited to this.

Those in charge, recognized very quickly, that inevitably the selection of the individual animal lead more or less, to breeding for form. Added to this, was that the selected male animals were used for breeding beyond normal bounds. As a rule, no one knew how the dog honoured with the title of Sieger, would perform and prove its worth as breeding animal.

Many dogs that were awarded the Sieger Title often times had no higher hereditary value, than many other dogs without this special mark of honour.

Give away Awards for Sieger first time 1900, for Herding trail dogs first time 1901, for Working dogs first time 1906.

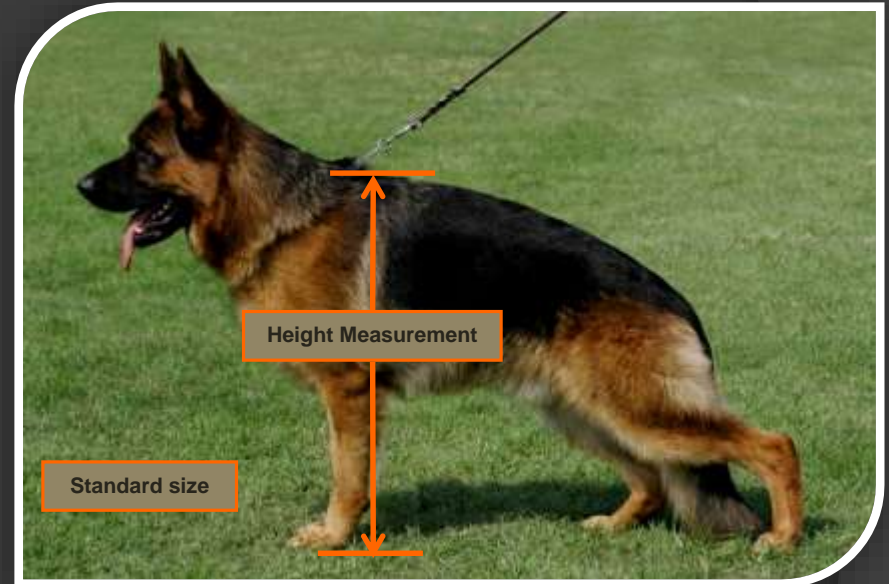
The breed standard – Size



The German Shepherd Dog is one of the medium size breeds.

Standard size	Bitches	Dogs
*Bitch – Dog Minimum size (cm)	54	59
*Bitch – Dog Maximum size (cm)	61	66
Standard – Female (cm)	55	60
Standard Male (cm)	60	65

*) Deviation within a range of 1 cm is allowed



The dog is measured with the Survey Stick from the withers perpendicular to the ground - touching the elbow joint . For the correct measuring of size, a straight and level base is a prerequisite.

The German Shepherd Dog is bred as a working dog and this requires being assessed towards his physical and mental working abilities.

The physical potential has to be understood not only in regards to working performance but also from the aspect of inner and outer organs.

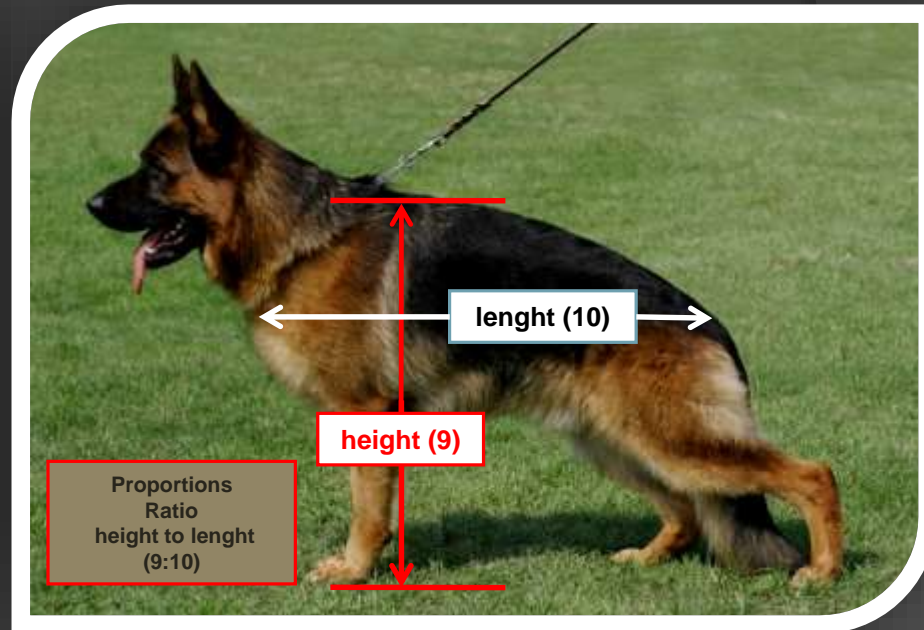
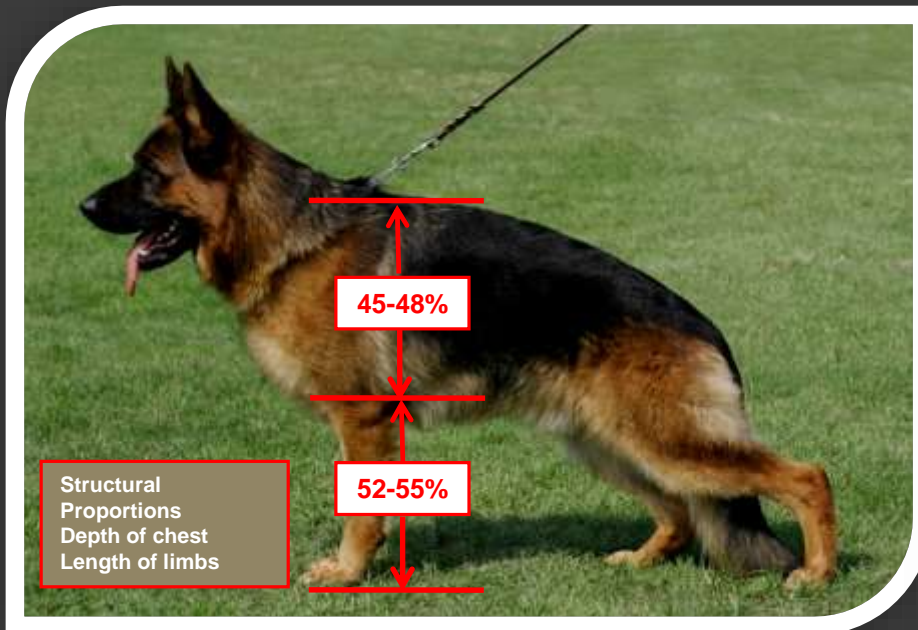
(Der Musterhund H. Klein 1955)

The breed standard – Structural Proportions



The main attributes of physical working ability are endurance, strength and agility. Each of these characteristics is of equal fundamental importance.

We know that these requirements are met best by medium sized and correspondingly strong structure. Falling below the standard size leads to loss of the required strength, whilst with oversize, when maintaining harmony, unnecessary ballast is created, which lessens endurance.



The correct proportion of length is defined that, with a moderate length of the back, a good overall length of the body is reached through the depth of fore- and hindquarter.

The breed standard- The Structural Proportions



The depth of the chest should be about 45% and the length of limbs about 55% of the height at withers. A correct angulated forequarter with an angulation of almost 90° is important for the balance of anatomy. Also the deep angulation of the hindquarter, as well as a long, slightly sloping croup with an angulation of about 23°. The German Shepherd Dog as a trotter differs from many galloping breeds through characteristics like a rectangular body, deeper angulation of fore and hindquarter and a longer, sloping croup.

The natural body stretch is necessary for three important functions

function 1

In the move forward the shortest distance of transmitting the power from the hindquarter to the forehand which absorbs and perpetuates the move.

function 2

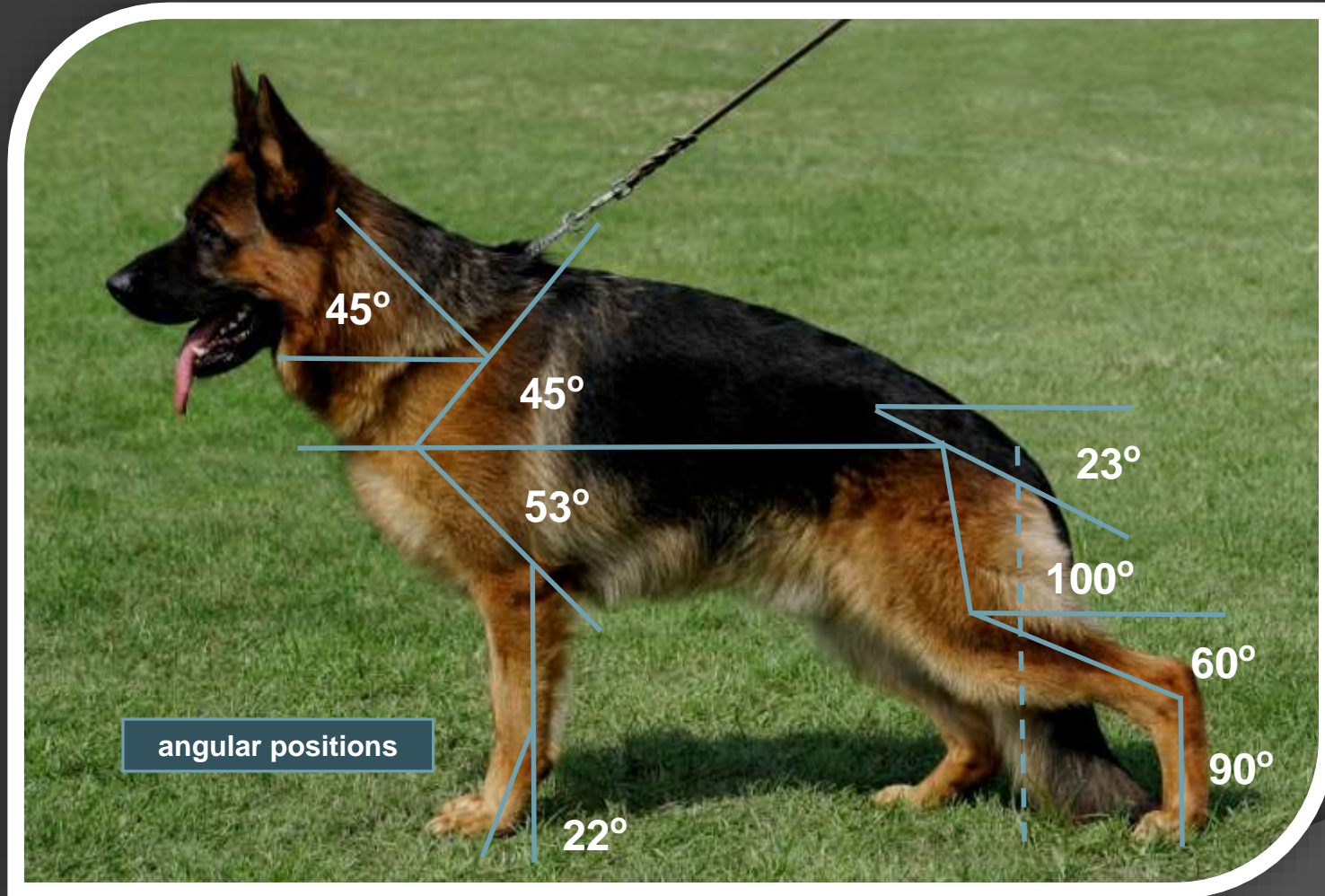
It gives the effective sequence of steps during the movement sequence.

On the other hand it gives the body the required prerequisites for the necessary stability and the therefrom resulting agility.

function 3

Another, essential function for the fulfillment of the three requested characteristics, and especially for the endurance, is attained through the angulations of the limbs and the length and lay of the individual bones or shanks to each other. These inherent natural angles of the trotter structure, give an elongation without increase in height, i.e. the utmost length of stride with retention of the necessary stability of the structure.

The breed standard- Structural Proportions



With this the frame of the physical structure is given. A natural good depth of the chest as result of normally developed organs complete the harmonious picture.

The breed standard – anatomy – introduction 1



The anatomy, part of the morphology, the composition, and therefore also a discipline of biology, the doctrine of life itself, gives information about the structure of living creatures. Originally, anatomy, in the proper meaning of the word anatomize or the art of anatomizing was to cut, to disjoint. As time went on the desired aim outgrew the simple dissection of the body. Its ambition is the exploration of form, texture and function of the living organism and its parts. This goal cannot be reached by simply cutting the dead body into pieces. However, cutting the body methodically into pieces gives information which make it possible to understand with further examination methods also the harmonious interconnection of the parts of the living organism. By dissecting the body of an animal, we have the opportunity to describe the parts according to placement, their attachment, shape, size etc, to register and systemize.

That the skeleton of the dog too, is the scaffolding, and thereby the framework of the whole structure, is known to every cynologist. However it is less known that the skeleton of the dog is constructed far less rigid than for instance, than that of a horse. Whilst in this, the individual parts of the skeleton are primarily joined by taut and generally very strong ligaments and tendons, in the dog apart from the always less developed ligaments, it is primarily the muscles, which connect the individual bones to each other and give the whole structure its inner support. The dogs musculature is therefore relatively stronger and of far greater complexity than that of the horse.

The breed standard – anatomy - Conclusions

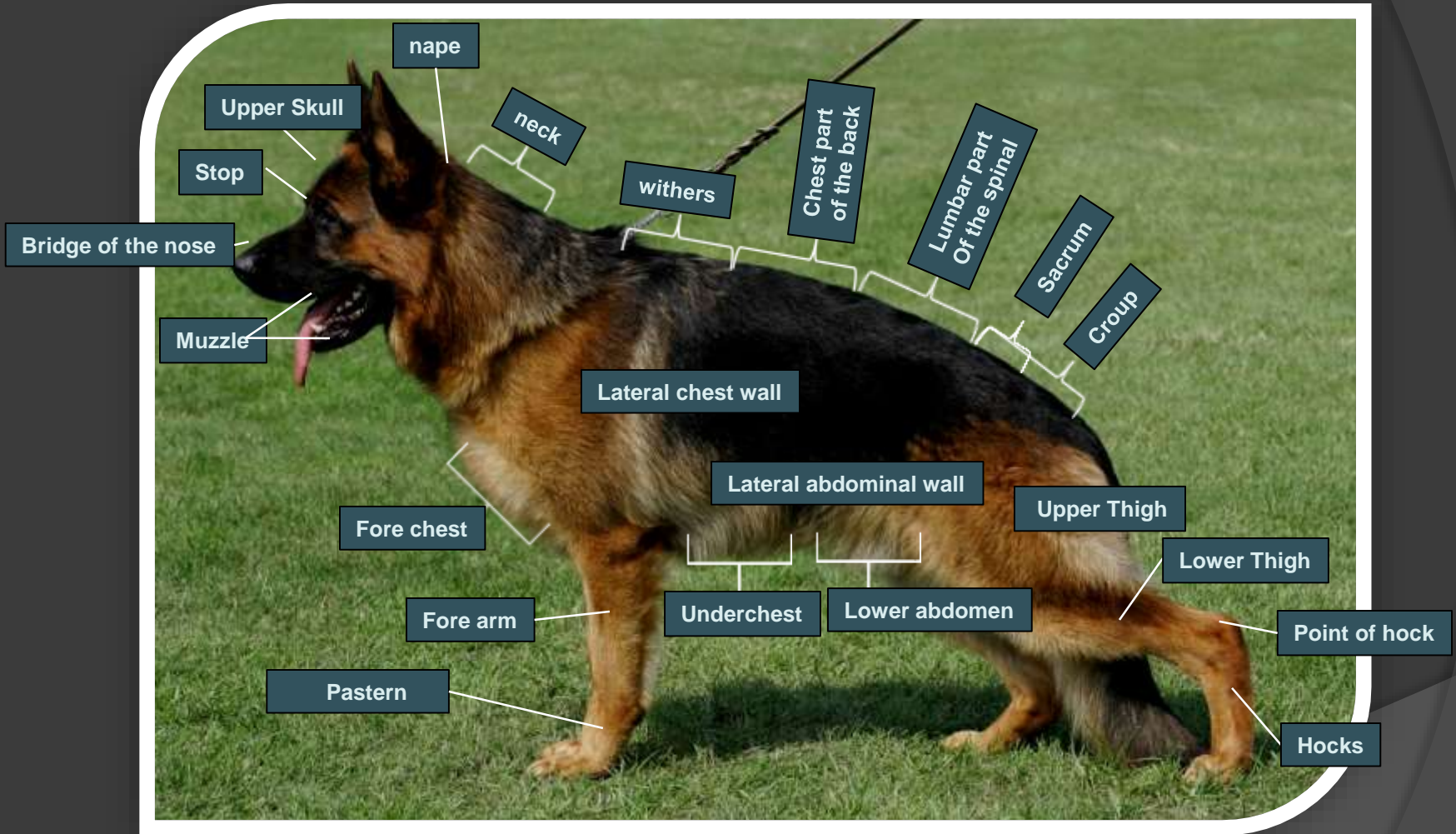


This causes two things:

Firstly, the dog is much more flexible and pliant and therefore much more difficult to judge. He will never stand still for any length of time and will hardly ever take up the exact same position a second time. For he is not only physically but also mentally more agile and more labile than most other pets and therefore, also his bearing depends largely on the prevailing mood. The same dog presents itself completely different in arousal, or when he is scared, distracted, without interest or tired.

Secondly, the individual parts of the skeleton are not fixed passive as the horse skeleton but primarily through active muscle work; this causes that, as well when he is standing as while moving the weight has to be carried by muscles which can fatigue and not by passive ligaments, tendons and fasciae. Because of this the dog is not able to carry heavy loads or to stand for a lengthy time. It is well known that he will use each opportunity to sit or lay down in order to relieve his muscles and to keep them always prepared and ready to go. Due to his comprehensive musculature, the dog is an extraordinarily quick and lithe very mobile animal.

Parts of the body and position descriptions

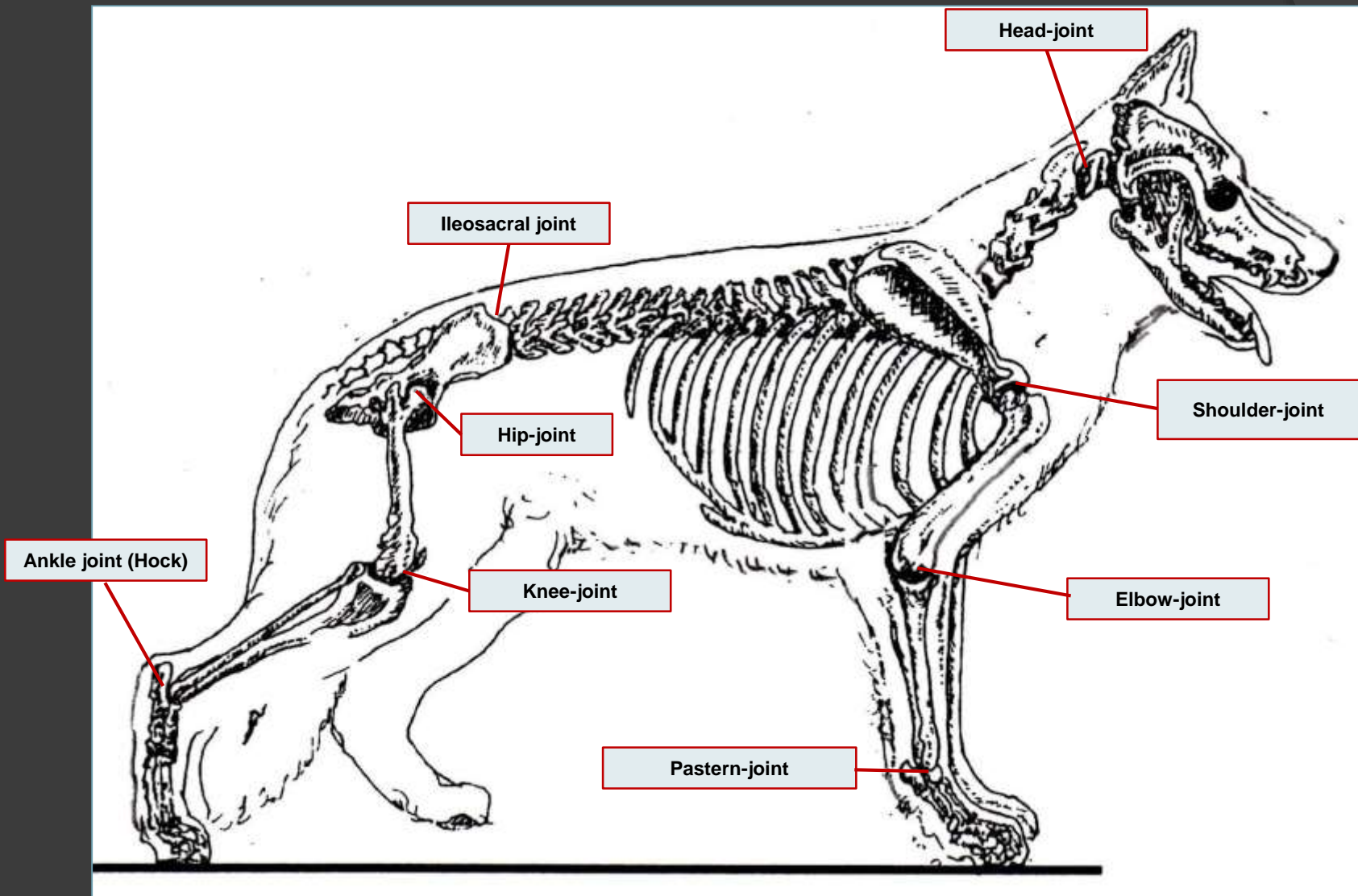


The breed standard – the skeleton

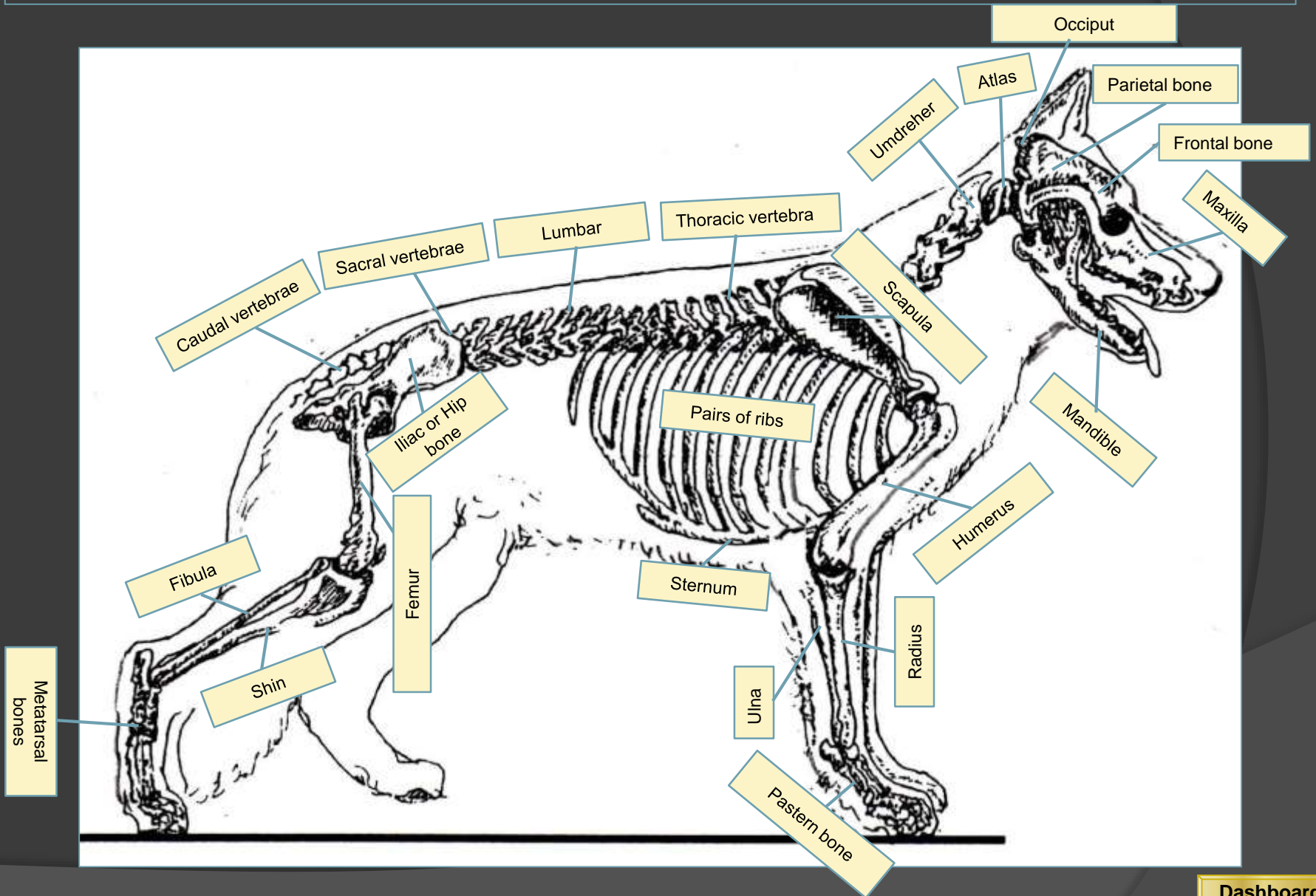


- All bones together form the skeleton. It is also called the passive musculoskeletal system.
- The skeleton gives the body the necessary stability and the prerequisite for spontaneous movement. .
- The skeleton is also the basis for the type- and individual specific constitution of the body.
- This weight bearing skeleton can ensure the enabling of movement by formation of flexible connection of the single bones, the joints.

The joint articulation



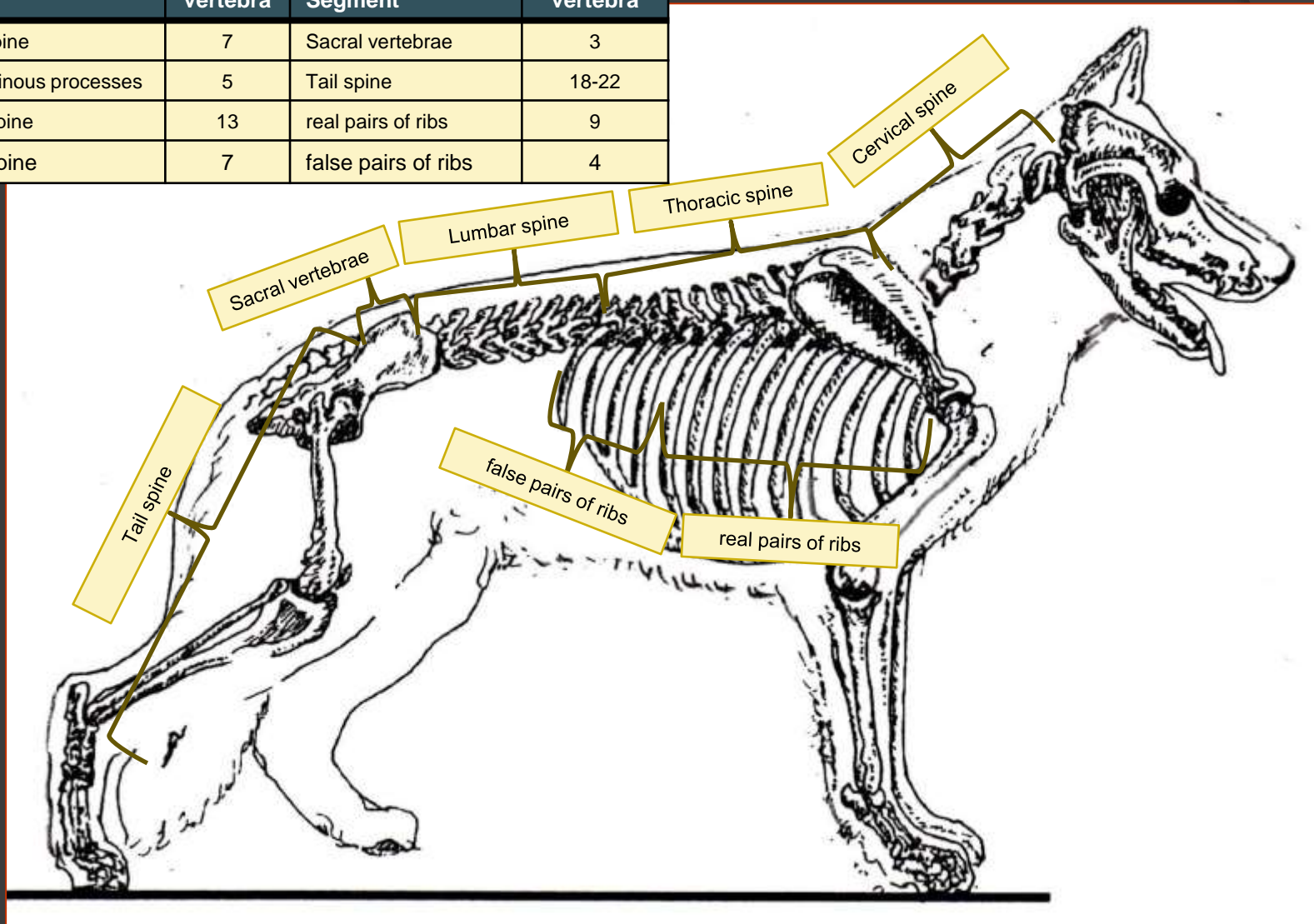
The skeleton system (vertebra and bones)



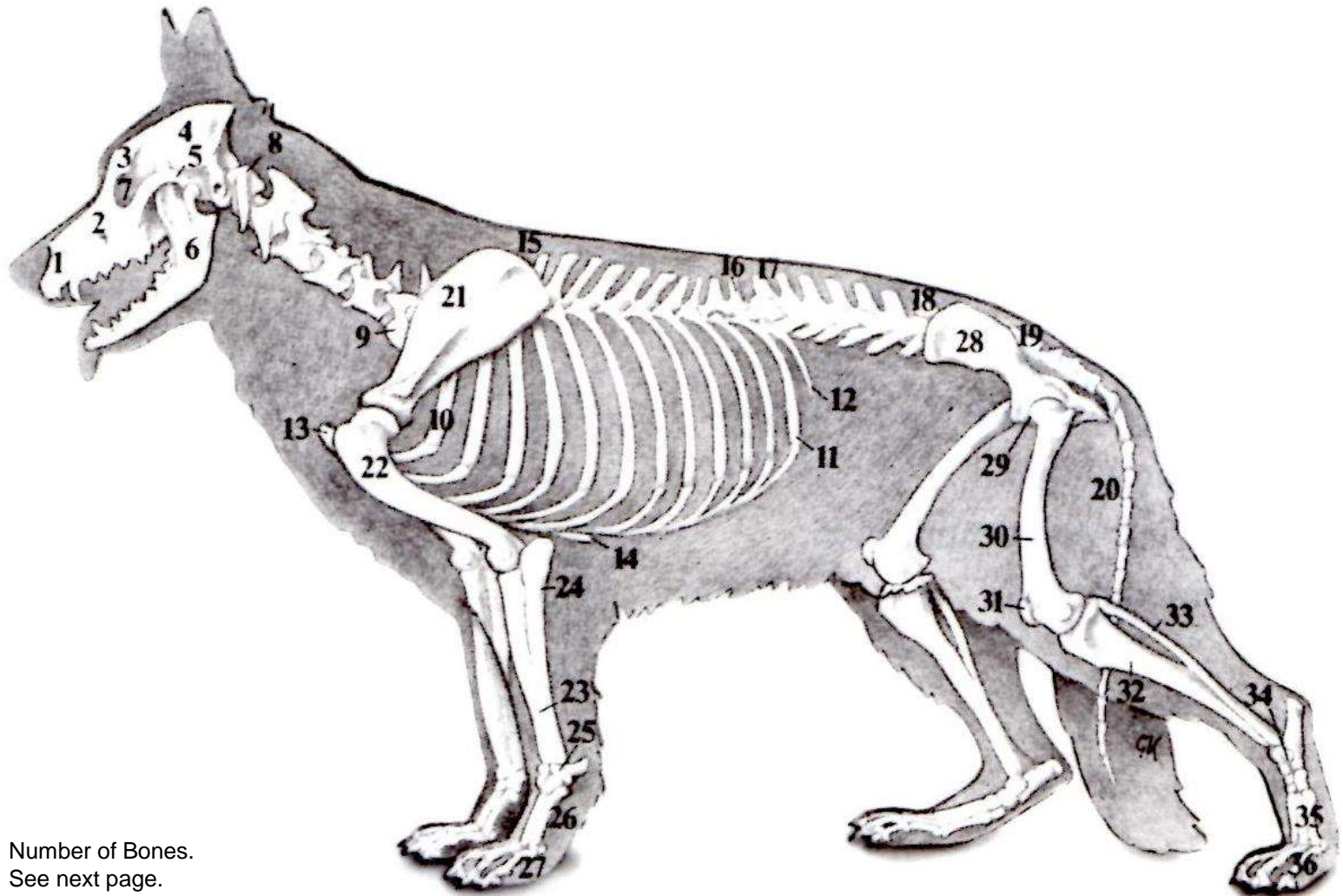
The Skeleton segmentation (number of vertebra)



Segment	vertebra	Segment	vertebra
Cervical spine	7	Sacral vertebrae	3
Withers spinous processes	5	Tail spine	18-22
Thoracic spine	13	real pairs of ribs	9
Lumbar spine	7	false pairs of ribs	4



The Skeleton – number of bones



Number of Bones.
See next page.

The Skeleton - number of bones



List of bone (see page before)

1 Incisive bone, pre-maxilla	11 Twelfth rib	21 shoulder blade (Scapula)	31 Patella
2 Maxillary bone	12 Rib meat, false rib	22 Upper arm	32 shin (Shinbone)
3 forehead (brow)	13 Sternum top	23 spoke (Radius)	33 Fibula
4 Braincase	14 Sternal notch	24 Ulna	34 Hock joint, tarsus
5 Zygomatic arch	15 Third thoracic vertebra	25 Carpal joint	35 Hocks
6 lower jaw (Mandible)	16 Thirteenth thoracic vertebrae	26 Pastern	36 Back toes
7 orbit (eye socket)	17 First lumbar vertebra	27 Front toes	
8 First cervical vertebra, Atlas	18 Seventh lumbar vertebra	28 Pelvis	
9 Sixth cervical vertebra	19 Sacrum	29 Hip joint	
10 first rib	20 Caudal vertebrae	30 Upper Thigh	

The breed standard – the muscular system



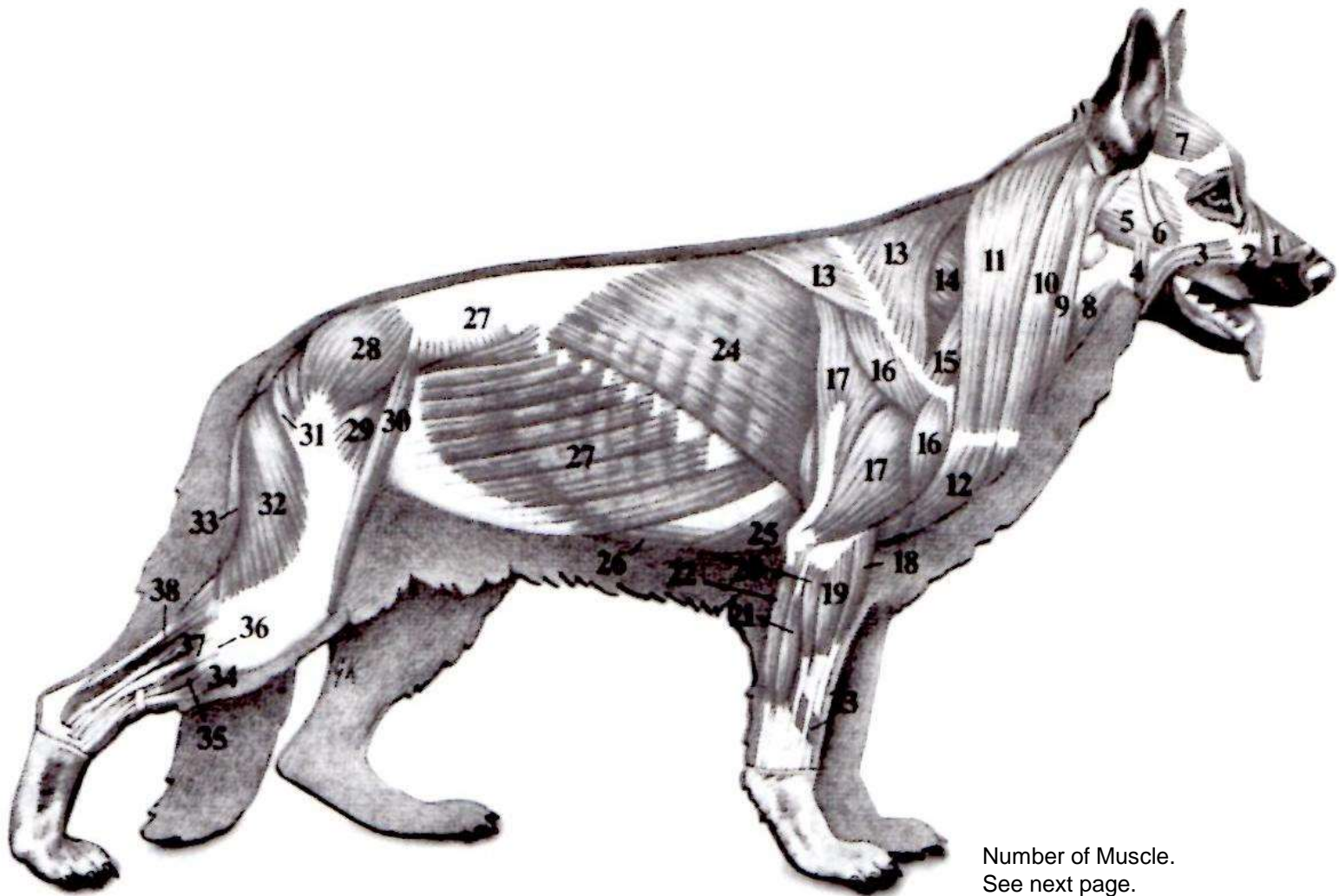
In order to perform physical movement, the animal needs all active muscles and passive bones which together make up the musculoskeletal system. The movement apparatus.

The bones act like internal levers to which the muscles adhere.

All the work to enable the many movements, of the individual parts and the limbs of the trunk, and the head, as well as for any movement of the whole body, is performed by the active musculoskeletal system, the movement apparatus, that is made up of a great number of muscles.

The required dynamic performance of movement is achieved in close coordination of the active musculoskeletal system and the passive part of the movement apparatus, the skeletal system.

The breed standard – the muscle system



Number of Muscle.
See next page.

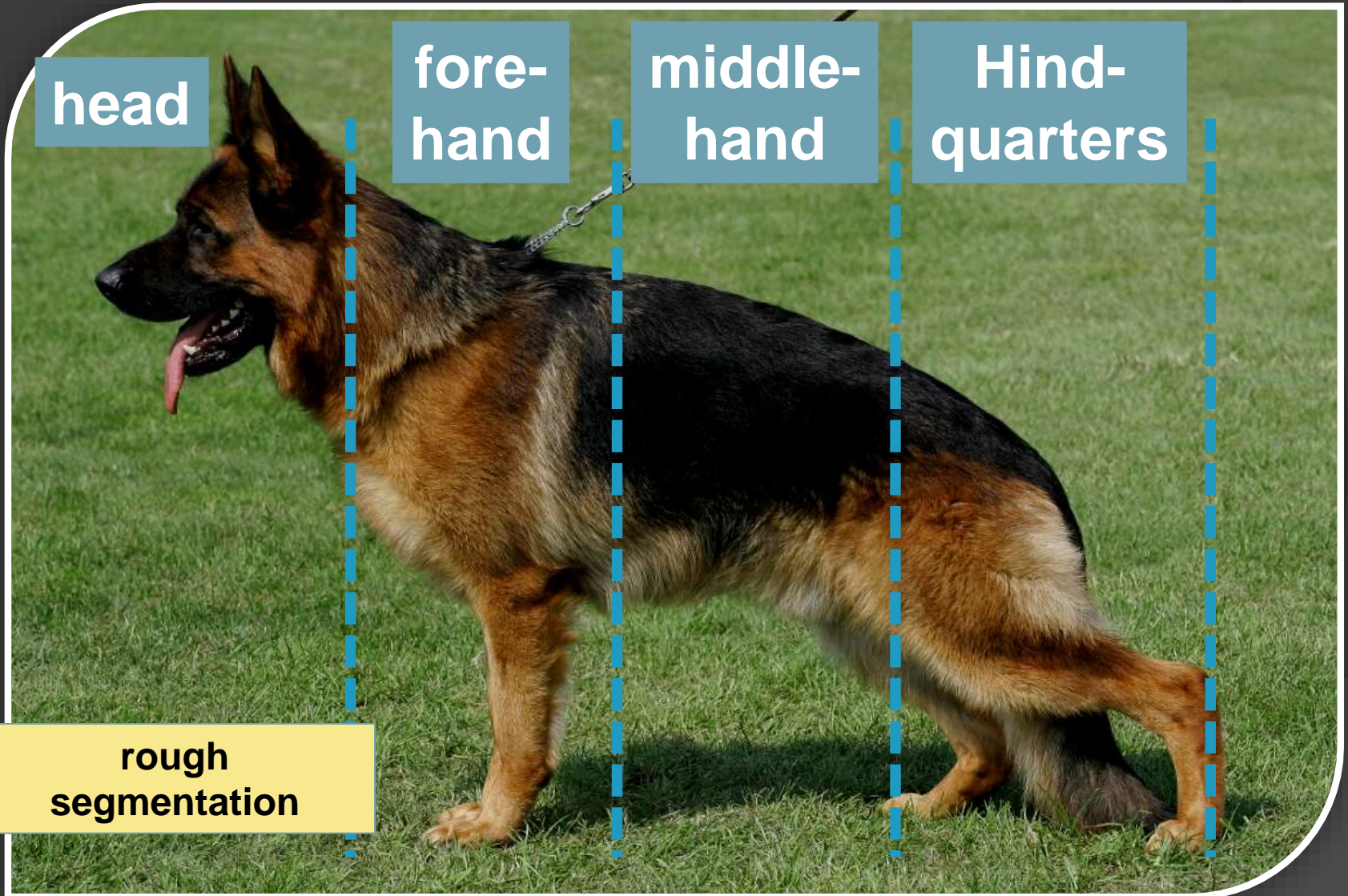


The breed standard – muscle Numbers & nomenclature

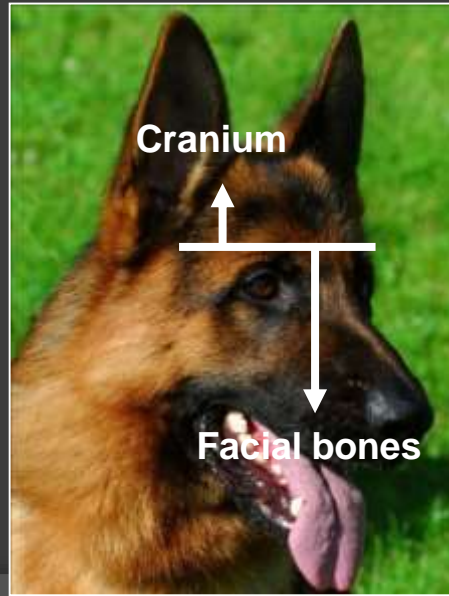
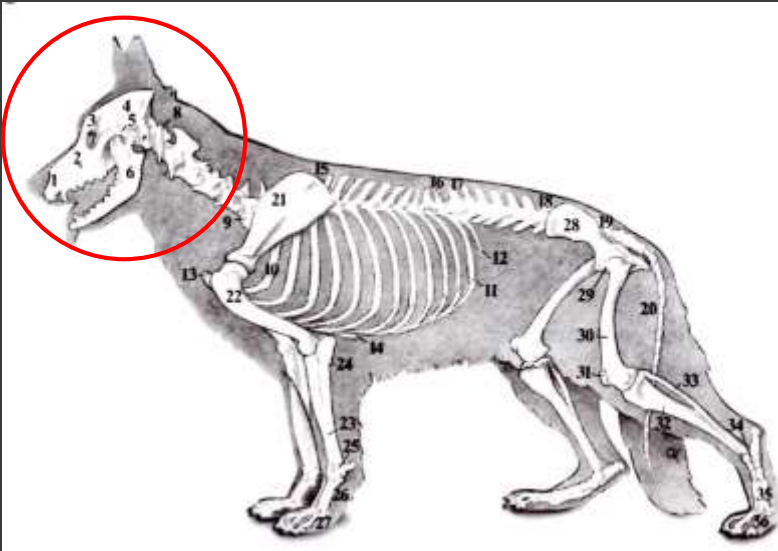
List of muscles (previous page)

1 upper lip levator muscle	11 Clavicle and neck muscle	21 Outside elbow extensors	31 Croup superficial muscle
2 Nose jaw muscle	12 Collarbone upper arm muscle	22 Inner elbow flexor	32 two-headed upper thigh muscle biceps femoris
3 Lip sphincter – lip constrictor	13 trapezius muscle	23 Long elevator muscle of the thumb	33 half tendon muscle, semitendineus
4 Cheek muscle, buccinator	14 lower serrated m. Levator scap.	24 Latissimus Dorsi	34 Frontal shin bone muscle
5 Outer masseter	15 Shoulder and neck muscles	25 Deep pectoral muscle	35 Long toe extensors
6 zygomaticus	16 deltoid	26 rectus abdominis muscle	36 Long calf muscle
7 temporalis muscle	17 triceps brachii	27 External oblique abdominal muscle	37 deep digit flexor
8 Breast hyoid muscle	18 Outer radial muscle	28 Middle Croup muscle	38 Achilles tendon, tendo calcaneus
9 Depressors auricle	19 Common toe extensor	29 Tensor lateral thigh m	
10 Sternal head muscle	20 Lateral toe extensors	30 sartorius muscle	

The breed standard – rough segmentation



The breed standard – the head (correct ratio)



- All descriptions start with the head, as it is the first part of the body.
- The head especially denotes the breed type, the sexual characteristics, (impression) and the expression (also the character) of our dog.
- The standard demands a broad upper skull and the right proportions of upper skull and foreface. The proportions should be 50:50.
- Furthermore a good depth of muzzle with a strong lower jaw.
- A strong jaw is the basis for sufficient space for development of strong teeth.
- When the muzzle is closed the lower jaw should be well visible from the side.

The bred standard – the head (expression)



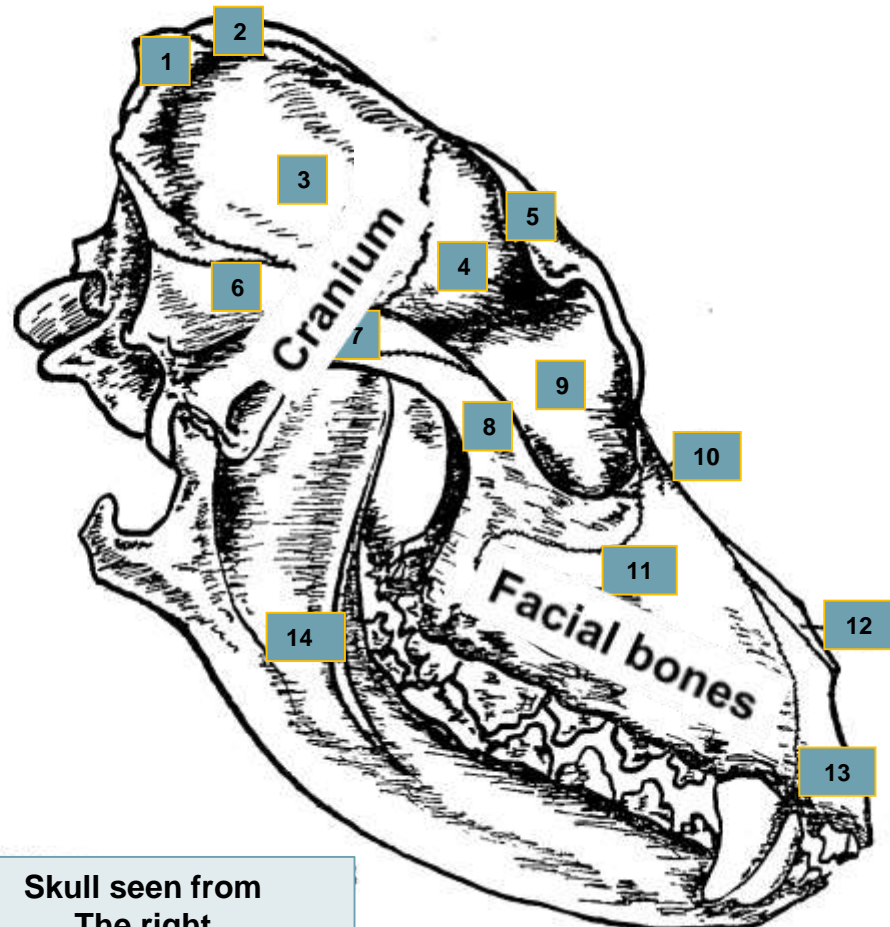
- **Correctly carried erect ears give the characteristic look to the German Shepherd Dog.**
Deep or wide set ears or even faulty ear carriage, i.e. inwards constricted ears, floppy or drooping ears are imperfect .
- **The slightly oblique set eyes should be almond shaped and as dark as possible (dark brown).**
- **Light brown to yellow eyes detract from the dogs „expression“.**

The breed standard– the head- skull of the dog



Skull of the dog

- 1 occipital bone
- 2 medium parietal
- 3 parital bone
- 4 coronal bone
- 5 zygomatic process of coronal bone
- 6 temporal bone
- 7 zygomatic process of temporal bone
- 8 cheek bone with orbital cavity lug of cheek bone
- 9 orbital cavity
- 10 lacrimal bone
- 11 maxillary bone
- 12 nasal bone
- 13 intermaxillary bone
- 14 lower jaw



Skull seen from
The right

The Breed Standard - the teeth - primary dentition



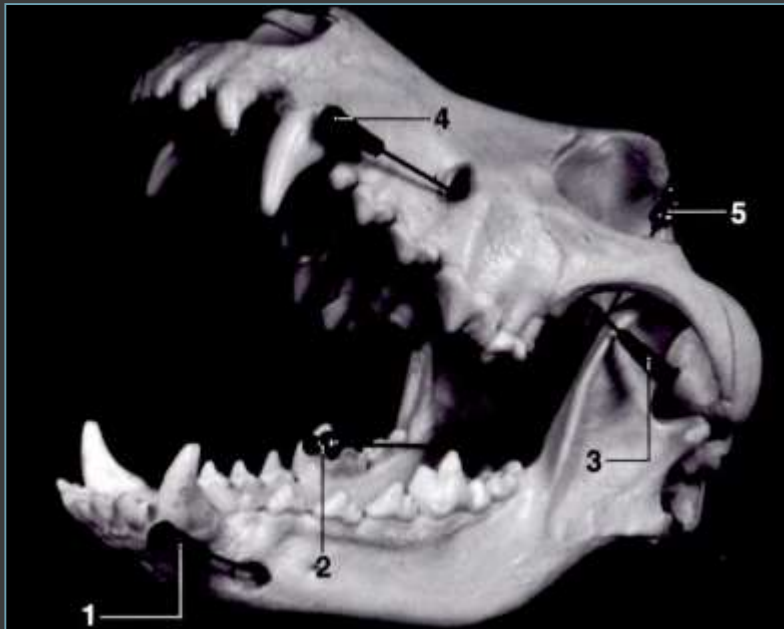
The deciduous dentition comprises in the upper and lower jaw, of respectively 6 incisors (Inzisivi), 4 canine teeth (canini) und 6 deciduous molar teeth.

primary dentition	Number of teeth	
<i>Upper jaw</i>	<i>14 teeth</i>	
Incisors (incisivi) – respective right – and left	3	3
Canine teeth – respective right – and left	1	1
Premolar respective right – and left	3	3
<i>Lower jaw</i>	<i>14 teeth</i>	
Incisors (incisivi) – respective right – and left	3	3
Canine teeth – respective right – and left	1	1
Premolar respective right – and left	3	3
<i>Complete denture (total)</i>	<i>28 teeth</i>	

The Teeth – permanent dentition



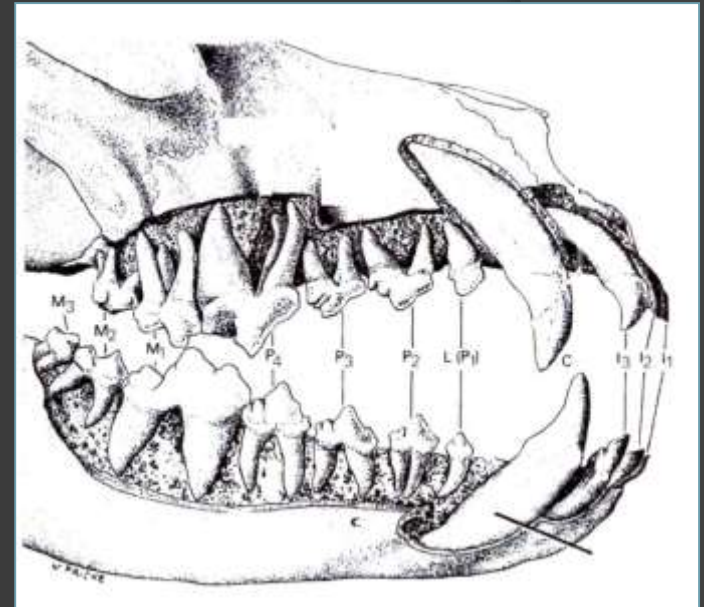
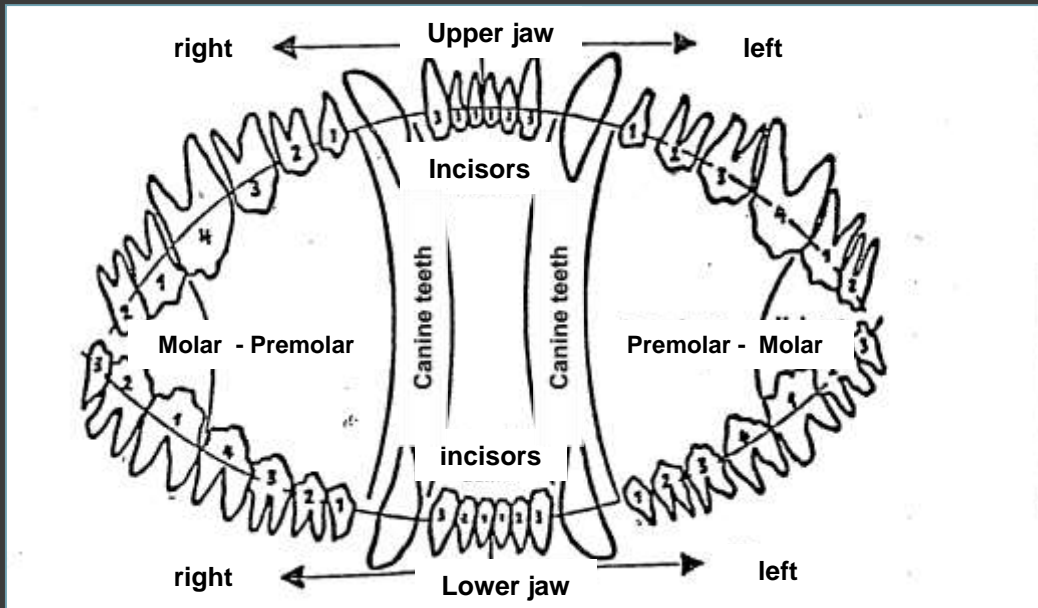
The complete dentition has 42 teeth;
Scissor like the incisors of the upper jaws reach over those of the lower jaw.
The incisors stand evenly placed in the rounded flowing dental arch.
The permanent dentition comprises in the upper and lower jaw, of respectively 6 incisors, (inzisivi) 4 Canine Teeth (caninus) and 8 premolar teeth, (Premolare)



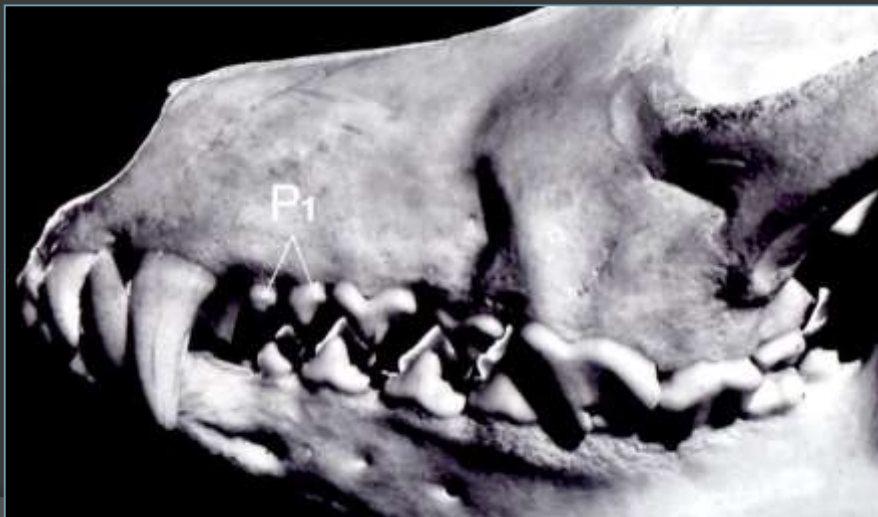
Complete denture

<i>Permanent denture</i>		Number of teeth	
Upper jaw		20 teeth	
Incisors (incisivi) – respective right – and left		3	3
Canine teeth – respective right – and left		1	1
Premolar respective right – and left		4	4
Molar respective right – and left		2	2
Lower jaw		22 teeth	
Incisors (incisivi) – respective right – and left		3	3
Canine teeth – respective right – and left		1	1
Premolar respective right – and left		4	4
Molar respective right – and left		3	3
Permanent denture (total)		42 teeth	

The breed standard – the dentition



Dental formula



Polyodontie
(double P1
Upper jaw)

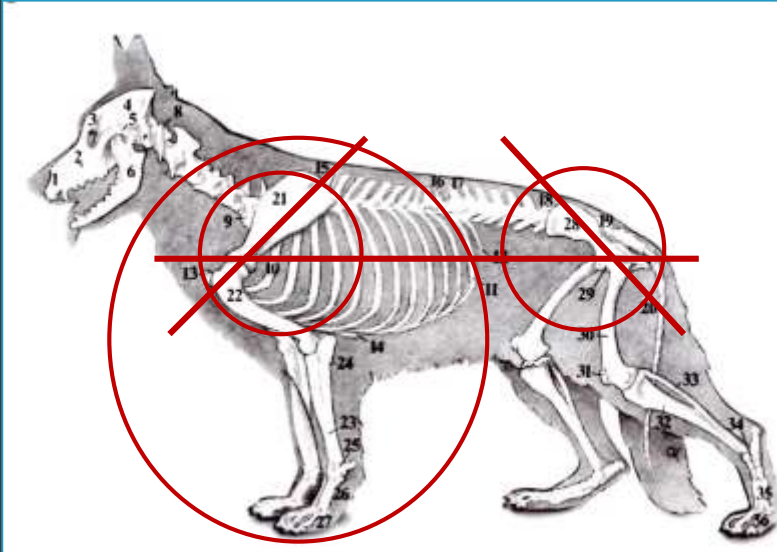
The Breed standard - Breed Survey



Eligible for breed survey	Grading	Teeth status
	Excellent select	Complete dentition without gaps, No irregularly spaced teeth No double teeth
	Excellent	Complete dentition without gaps. Double Premolar 1 possible
	Very good	When missing: 1 Premolar 1 or 1 Incisor
	Good	When missing: 1 Premolar 2 or 2 Premolar 1 or 1 Premolar 1 + 1 Incisor
	Open bite malocclusion: Slightly open bite malocclusion allows breed survey. (Former KKL 2)	
	Attrition and discoloration: If age-related will be considered in grading but without significant downgrading. If teeth are yellowed or browned but the dental substance is intact breed survey is possible. (Former KKL 2)	

Not eligible for breed survey	Grading	Teeth status
	Good	When missing: 1 Premolar 3 or 2 Premolar 2 or 1 Premolar 2 + 1 Premolar 1 or 1 Premolar 2 + 1 Incisor or 2 Incisors
	Insufficient and Breeding ban	When missing: 1 Premolar 3 + 1 further tooth or 1 Incisor or 1 Premolar 4 or 1 Molar 1 or 1 Molar 2 or A total of 3 teeth or more
	Insufficient and Breeding ban	Decayed teeth: Precludes breed survey
	Insufficient and Breeding ban	Other tooth or jaw faults Over and under shot When over and underbite is obvious (Gap between the Incisor of the upper jaw and those of the lower jaw in size like matches or larger) a breeding ban has to be imposed.

The breed standard– the forehand



The shoulder joint and the hip joint on one level (same height)
Both pairs of extremities are mirror inverted according to their function as well as also the initial position of their main bones (shoulder and hipbone) is mirror inverted.

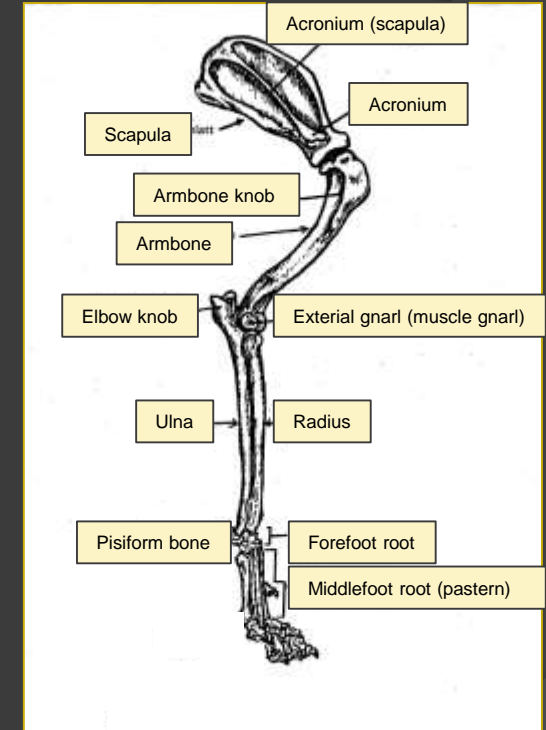
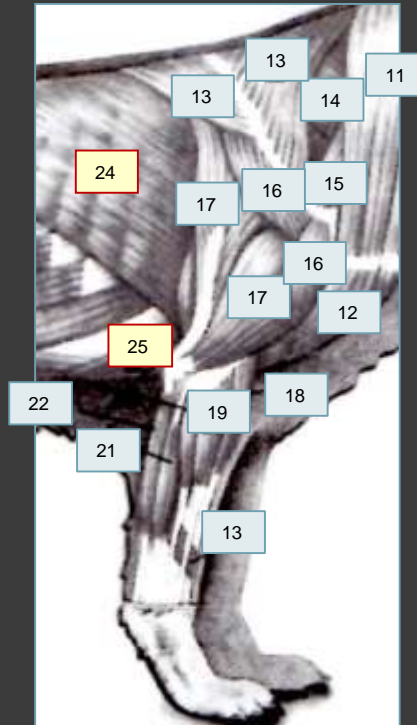
It has to be differentiated between fore- and shoulder extremities that is the forehand, and the hind- or pelvis extremities of the hindquarter.

The extremities are segmented pillars and have to carry the body while standing and transport it when moving.

The forehand – muscular and bony structure



Unlike the hindquarter the forehand is not connected to the body with a joint but only by the musculature, as with a carrying strap.



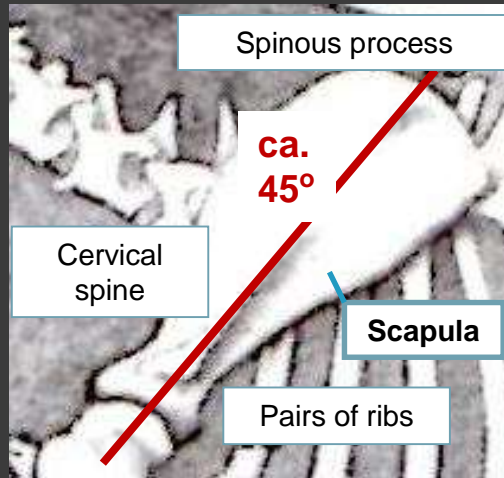
The muscles of the forehand

11 Collarbone-cervical muscle
12 Collarbone-upper arm muscle
13 Trapezius muscle
14 Lower serrated muscle
15 Shoulder-cervical muscle
16 Deltoid muscle
17 Triceps
18 Exterior radius muscle
19 Mutual tow extensor

20 Collateral tow extensor
21 Exterior elbow extensor
22 Inner elbow extensor
23 Thumb drawing muscle

24 und 25 are thoracic muscles
24 Broad back muscle
25 Low-pitched pectoral muscle

The scapula – Description – function - attachment



Description

The scapula is a flat, triangular bone.

The undersurface towards the ribs is slightly convex.

The scapula is placed at an angle set at about 45°.

The scapula lies at the side of the chest and the upper edge lies flat angled at the wither which is formed of the first five thoracic vertebrae i.e. their spinous process. On the upper side, the acromion, the scapular spine, runs along the length of the shoulder blade. It strengthens the scapula and is the base of attachment for the different muscles. A round cavity at the end is for the upper arm bone.

Function

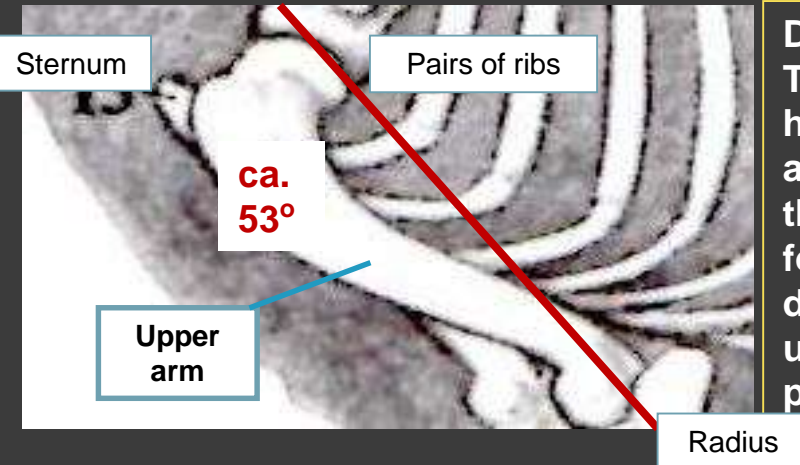
The scapula can execute several moves: Flexion (to bend), Extension (to stretch), Adduktion (to pull inward), Abduktion (to pull outward) and Zirkumduktion (to turn)

Attachment

The forehand is supported by the shoulder girdle muscles by synsarcosis (muscle attachments) as in a muscular sling between the front extremities. The scapula is not connected to the body with a joint but with muscle lying over and under each other, connected to the ribcage. Type- and individual specific the chest as well as the scapula are formed in the way to meet requirements of the movement and lifestyle of the animal.

Synsarkose (from Greek syn, together ' , sarkos' flesh') referred to in the anatomy of a compound of bone by skeletal muscles.

The upper arm – Description – function- angle



Description

The bony basis of the upper arm is an elongated bone, the humerus. It is a long bone which angles obliquely back and downwards. It lies exactly in the opposite direction to the scapula. It has different projections and depressions for attachment of the muscles. Like all long bones it has a distal and proximal epiphysis. On the lower end of the upper arm bone, the distal end, are two articular processes which articulate with the radius.

Function

The upper arm bone can execute two moves, flexion (to deflect) and extension (to stretch)

Angulation

Upper arm and scapula form the shoulder joint or point of shoulder. The flexible angle between scapula and humerus creates the shoulder angle which ideally is ca. . 98o – 100o

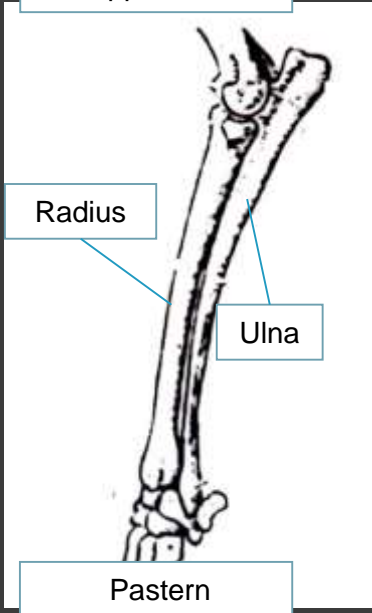
Distal means "further from the center of the body" or location (of an organ) "removed".

Proximal (. From Latin proximus = neighbor) is in the anatomy of a layer name that means located towards the body or towards the body running,

The lower arm – Description – function



Upper arm

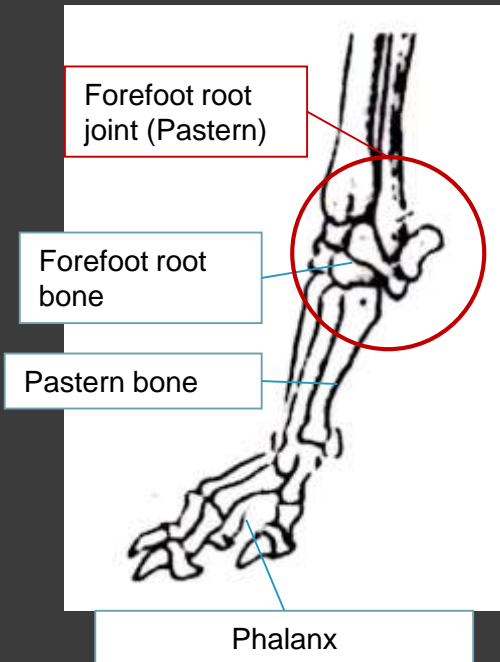


Description

The foreleg or lower arm bone consists of two bones, the Radius and the Ulna. The radius is slim, slightly forward curving, long bone, the proximal (near the body) end of which widens at the head and articulates with the humerus. At the distal end, the lower end, the radius thickens towards the trochlea radii, to form the flexible connection to the pasterns. The ulna is attached to the radius from behind and extends above it, widening towards the elbow's acromioclavicular process and olecranon tuber. Here, towards the radius, is a contact face for the articular surface of the upper arm.

This means that the humerus rests on the radius as well as on the ulna, and forms a pivot-type synovial joint with articulation between the head of the radius and the radial notch of the ulna. The elbow provides the connections for leverage effect of muscles. The olecranon process, lies at the level of the sternum. Pathological mutations, called Elbow Dysplasia, can arise in this joint.

The pastern – Description – function



Description– Function

The pasterns correlate with the hand of the human and consist of the carpal bones, the metacarpal bones and the phalanges.(toes)

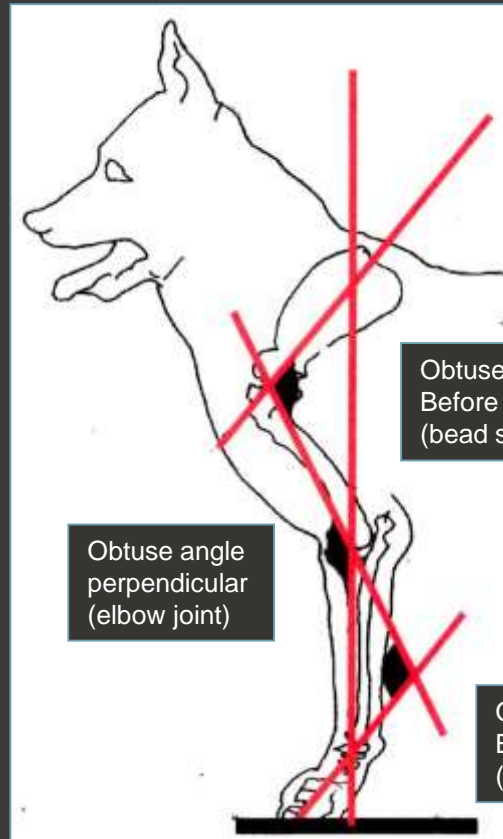
The carpal joint is composed of a series of 7 little bones that are divided into two three fissures, that is 2 rows, 3 in the top, and 4 in the lower row. It functions through the coordination of the bones of the forearm, the carpals, and the metacarpals.

The Radius and ulna rest on the first row of these bones. All the bones offer contact faces for ligaments and tendons.

The 5 long, slim, metacarpal bones (together with the carpals, called the pasterns) correspond to the palm of our hand, that we too can feel down to the fingers. These are joined by the 4 toes on which the foot stands. Each of the toes is again comprises 3 toe joints, where the third one is the distal phalanx with the claw. (toenail)

Unlike a human, a plantigrade, the dog is a digitigrade.

The forehand - Outline – angular positions



Obtuse angle
Before the plumb line
(bead seat angle)

Obtuse angle
perpendicular
(elbow joint)

Obtuse angle
Behind the plumb line
(hyperextension carpal joint)

Angele of inclination
Neck to torso
(Angle to the horizontal) about 45°

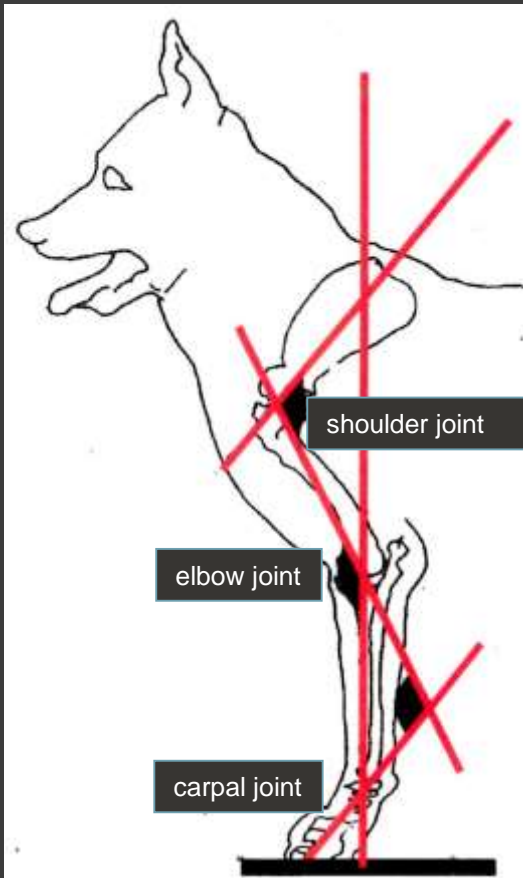
Scapula about 45°
lay back

upper arm about 53°
Angle of inclination

Carpal joint angle about 21°

As main bearer of the trunk the forehand is a three segmented pillar which is exactly vertically centered in the contact point of the weight (at the scapula or its center of rotation) from the dog's bottom of the foot.

The forehand- Description of the structure



Looking at the forehand as a whole we can see, if the dog is in normal position, a three segmented pillar. However, only in cooperation with muscles, tendons and ligaments are the single skeleton parts connected into an effective leverage.

In normal position, the contact point of the weight, the body weight, is effective at the scapula at a point which is also corresponding with its rotation field and is located in the middle of the contact face of the musculus serratus. The foot is vertically under this point. This means the perpendicular falls from the contact point through the rotation axis of the elbow joint and the proximal part of the antibrachial skeleton (forefootbone) in the middle of the foot.

The supporting pillar forms in each case a center edge angle before (head set angle) and one behind the perpendicular, (hyperextension of carpal joint) which clash in the elbow joint and with this form the third, the elbow angle.

In order to carry the hanging load all joint angles of this supporting pillar have to be protected from folding and have to be fixed. This is ensured through ligaments, tendons and muscles.

The breed standard – the support lines



Like every movable body, that of the dog too, is controlled by the laws of statics and dynamics. Whilst the statics concern the construction principles for maintaining the balance of the individual parts as well as for the whole body of the animal, standing at rest and during motion, the dynamics deal with the movement process as it is predominately seen during locomotion, i.e. during the specific study of movement in our dog.

As a firm body the animal organism too is governed by various factors, its construction elements however do not merely have to support the weight, and to keep its equilibrium, but also to equally serve movement. They are therefore, generally simultaneously, subjected to static as well as dynamic stress, during which the dynamic stress, always depending on the muscle contraction and the speed of the motion sequence, can vary greatly.

In most cases the static structural principles can therefore not be clearly based mathematically, but generally only at hand of certain empirical facts founded in experience and inferred from suitable technical models of the anatomical factors. (Comparative anatomy)

As the forward locomotion for the construction of the movement apparatus in total as also individually, is primarily of crucial importance, the static construction individualities also have fundamental contributing factors from the dynamics sphere, which in part decide on considerable differences for the species of animal.

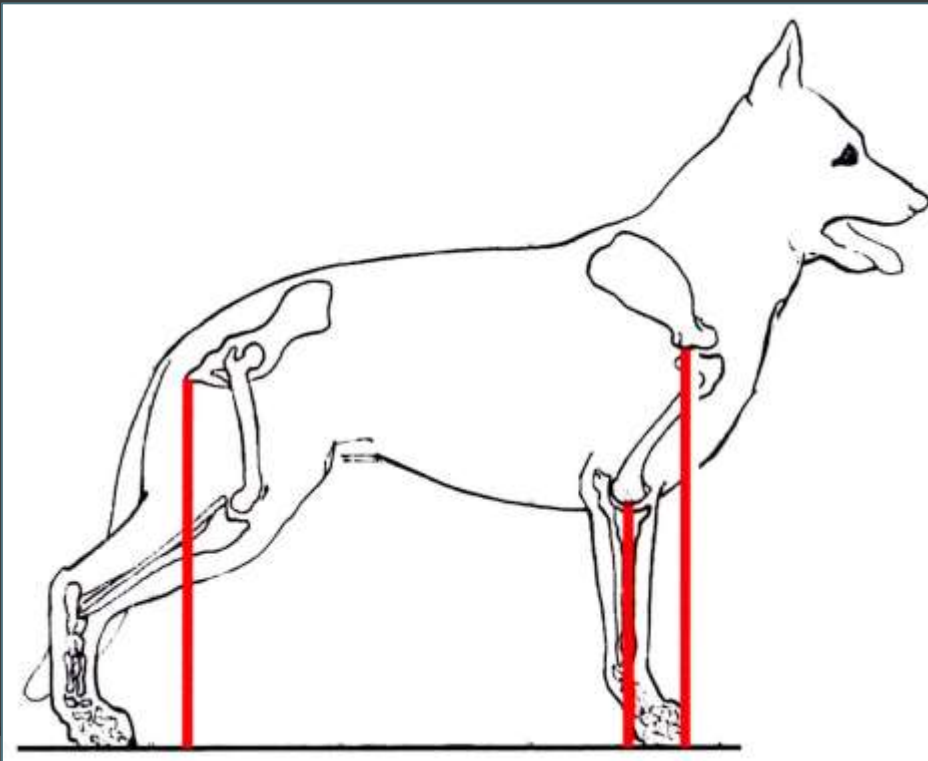
We want to address here the question of balance and also that of the support of the weight of the body by the limbs.

The optimal orientation or direction of the limbs in comparison to the ground, results in vertical lines of support and the static deal with these lines of support. Lines of support are imagined, that is, imaginary lines, that are drawn from the shoulder and the pelvis in profile through the joints, vertically to the ground.

The forehand - support lines



Straight lines of support are of greatest importance for the correct sequence of movement. If the lines of support are not correct, this will displace the balance point of the dog; which causes an unfavorable distribution of the body weight. If the lines of support are not straight, the suspension of the limbs during the various gaits would be detrimentally affected. As one can see, the lines of support run vertically through the joints. A straight bone formation is a prerequisite for a reliable stand and the correct movement of the dog. The Shepherd Dog must have correct straight lines of support, because only then will he be able to stand for a prolonged time and have an enduring trot.

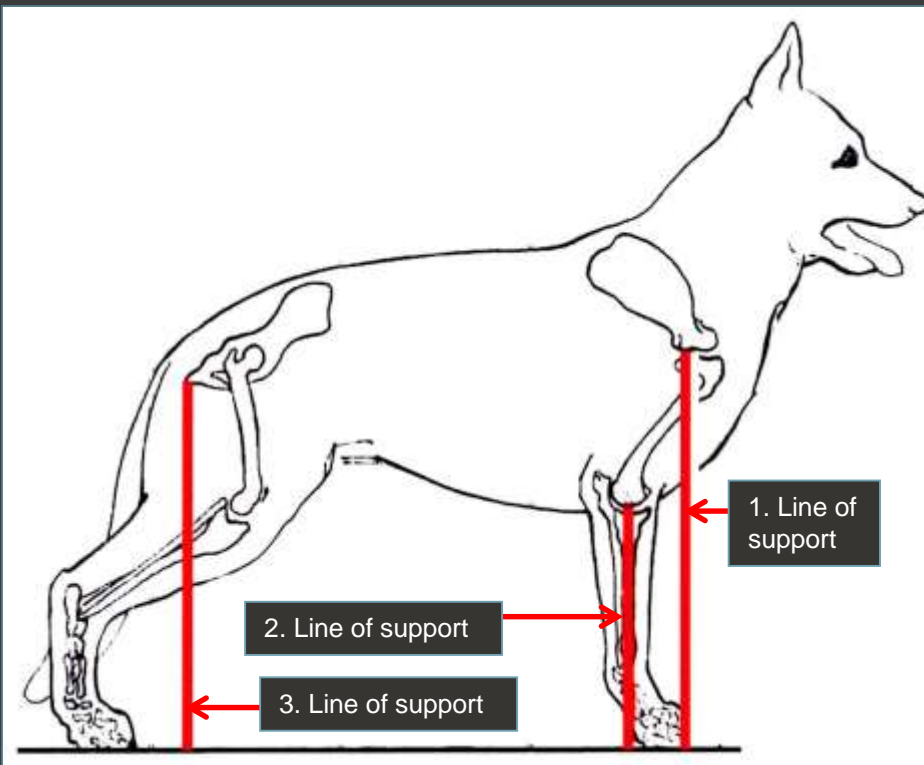


This is the correct flow of the lines of support viewed from the side as well as in profile.

Lines of support viewed in profile (from the side)



In the forehand, the lines of support are examined from the front and from the side. From the side two imaginary lines are of greatest importance in the assessment.

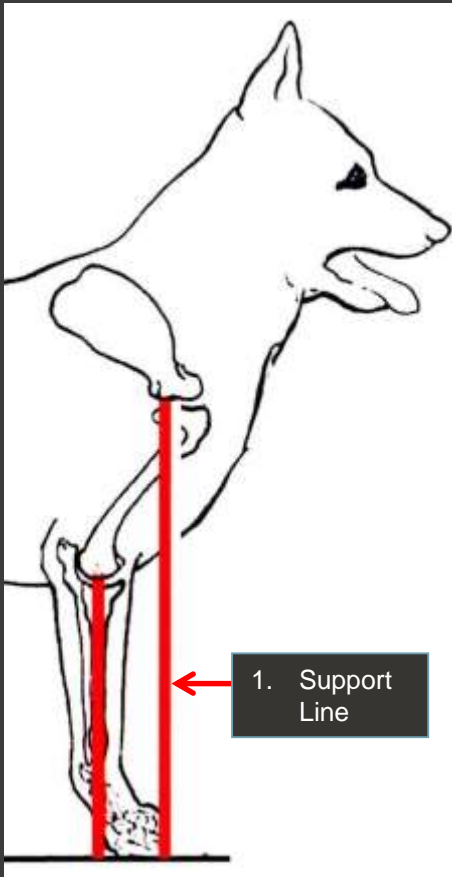


The first line of support starts at the shoulder joint and runs vertically to ground, whilst touching the tips of the toes as it strikes the ground.

The second line of support arises in the center of the elbow joint and also extends vertically through the middle of the forearm. It cuts through the middle of the pastern and cuts the pasterns halfway until it appears again just before hitting the ground.

The third line of support is dealt with under pelvic limbs.

Deviation of the lines of support viewed in profile.



1. Line of support.

Under set - set too far under.

The front line touching the ground in front of the toes is called under-set. Standing too far under.

Causes: The shoulder extends too straight (horizontal), or the pastern joint flexes too far.

Result: The dog lifts his feet while walking only slightly from the ground (i.e. He drags on the ground)

2. Set forward

If the front line of support however meets the ground behind the foot that is called standing forward.

Causes: The shoulder is too steep (i.e. forward placed)

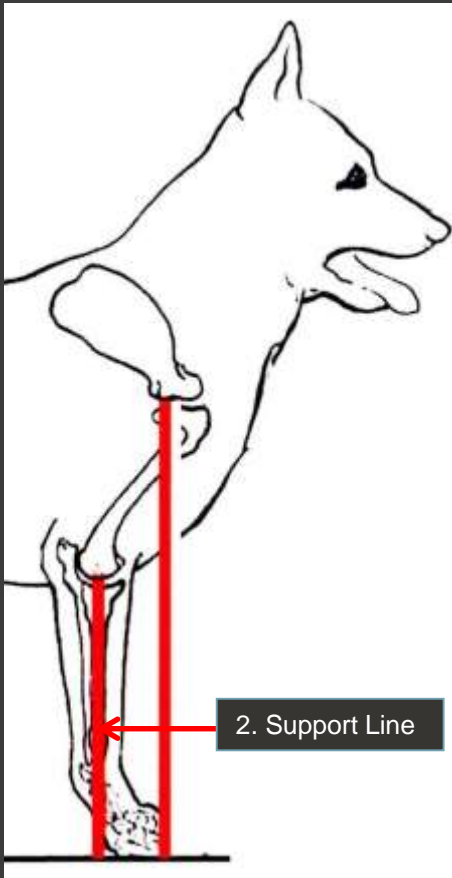
Result : overloading the lumbar region and the pelvic limbs' center of gravity to the rear. The forefoot pads are more stressed.

Standing forward leads to increased balance, to the detriment of speed.

Deviations of line of support result from an incorrect lay of shoulder, which is set too horizontal, if under – set, or in the case of being steep, forward placed, is called set forward.

Deviations from these imaginary lines seriously impact on working ability and lead to restrictions standing at rest and during movement.

Deviations of the lines of support seen in profile



2nd line of support.

The correct line of the front leg, should start from the elbow joint, run through the middle of the foreleg and coming out halfway down the pasterns, down to the ground. Deviations from the straight path may be caused by a curvature of the carpal bones forward or backward. Even the forearm can assume quite a convex shape and affect the straight course.

Forward curvature

If the curve is towards the front, we speak of forward curvature. That is, the line comes out too far forward, outside the pads of the toes.

Cause: The pasterns are too flat or soft.

Backwards curvature.

If there is bowing out behind the line of support, we call that bowed back.

The line comes out further back and cuts the middle of the toes.

Cause: The pasterns are too steep.

Deviations of the second line of support result from incorrect pasterns, coming out too far forward in forward curvature and too far back if bowed back.

The support lines seen from the front



Figure 1
correct front

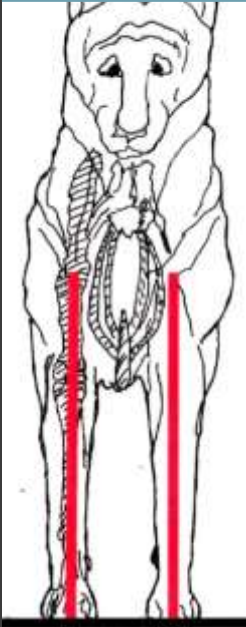


Figure 2
Toeing out, east west

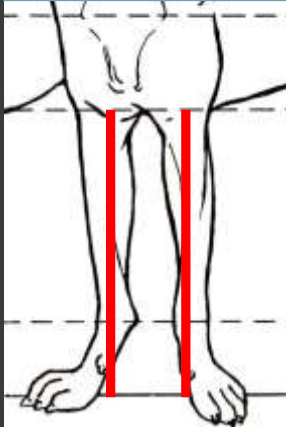
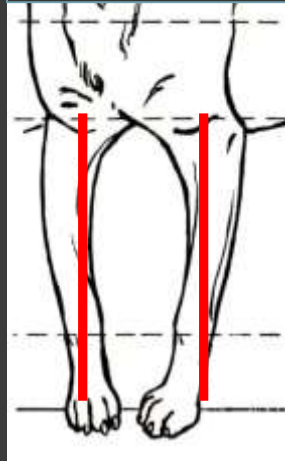


Figure 3
toeing in,

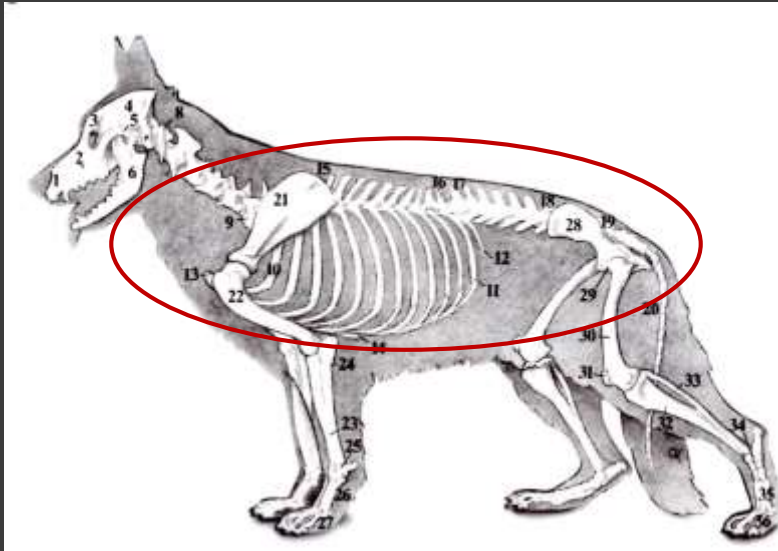


From the front, only a single line of support is assessed, that correspondingly runs through both sides. This line goes from the point of shoulder through the forearm, the tarsus and metatarsus, going through them all exactly in the middle straight down to the ground.

In case of deviations from the straight line support (front position Figure 1), the following misalignments or faults (Figure 2 and 3) occur:

1. The limbs are too far outside this vertical line. Here we are talking about moving or stepping wide. (No sketch available)
2. If the limbs too far within this vertical line, we speak of standing or stepping close or narrow.
3. If the limbs follow the course of the lines of support only to the pastern bone and then deviate inward it is toeing in. (Figure 3)
4. If the front legs are parallel to the support lines and diverge outward, at the level of the carpal bones this is called toeing out, (standing French, or East-West. This fault can occur on both sides or on one leg. (Figure 2)

The breed standard– the middle hand



The skeleton of the trunk – spine

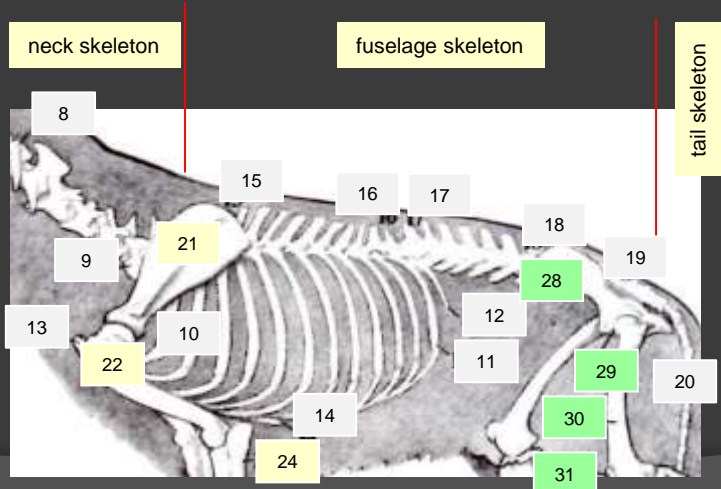
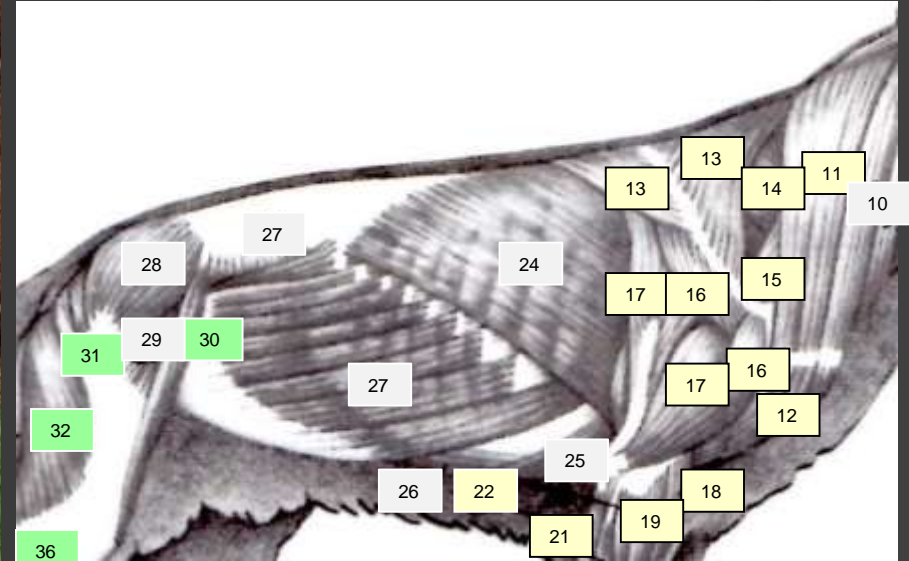
The axial skeleton is divided into the skeleton of the neck, torso (trunk) and the tail skeleton. The torso is formed by the bones of the thorax, the lumbar and sacral vertebrae as well as the skeleton of the extremities (hindquarter) that deal with the pelvis.

The skeleton of the trunk contains the spine (axial skeleton), the ribs and the sternum and therefore shows a structure typical for segmentation. The pairs of ribs are the bony basis of the thoracic wall with their dorsal end (towards the back) and the ventral end (towards the stomach) and are connected directly or indirectly with the sternum. Those grouped together bones form the thorax; which contains the chest cavity.

The middle hand muscular and bony structures



Subdivision skeleton of the neck, trunk and tail skeleton. The trunk is formed by the bones of the thorax, lumbar and sacral vertebrae and pelvis.



Muscles of the trunk

- 10 Sternal head muscle
- 24 Latissimus Dorsi
- 25 Deep pectoral muscle
- 26 Rectus abdominis
- 27 external oblique abdominal muscle
- 28 Middle Croup muscle
- 29 Tensor of lateral high muscle

The muscles of the forehand

11 to 22 have already been described in the forehand

Muscles of the hindquarters

- 30 sartorius
- 31 croup superficial muscle
- 32 two-headed thigh muscle
- 36 long peroneal muscle

Skeleton of the trunk

- 8 first cervical vertebra
- 9 sixth cervical vertebra
- 10 first rib
- 11 twelfth rib, 12 false rib)
- 13-14 Sternum Start to Finish
- 15 third thoracic vertebrae
- 16 thirteenth thoracic vertebra
- 17 first lumbar
- 18 seventh lumbar vertebra,
- 19 Sacrum
- 20 caudal vertebrae

Skeleton of the forehand

- 21 scapula
- 22 upper arm
- 24 Forearm (ulna)

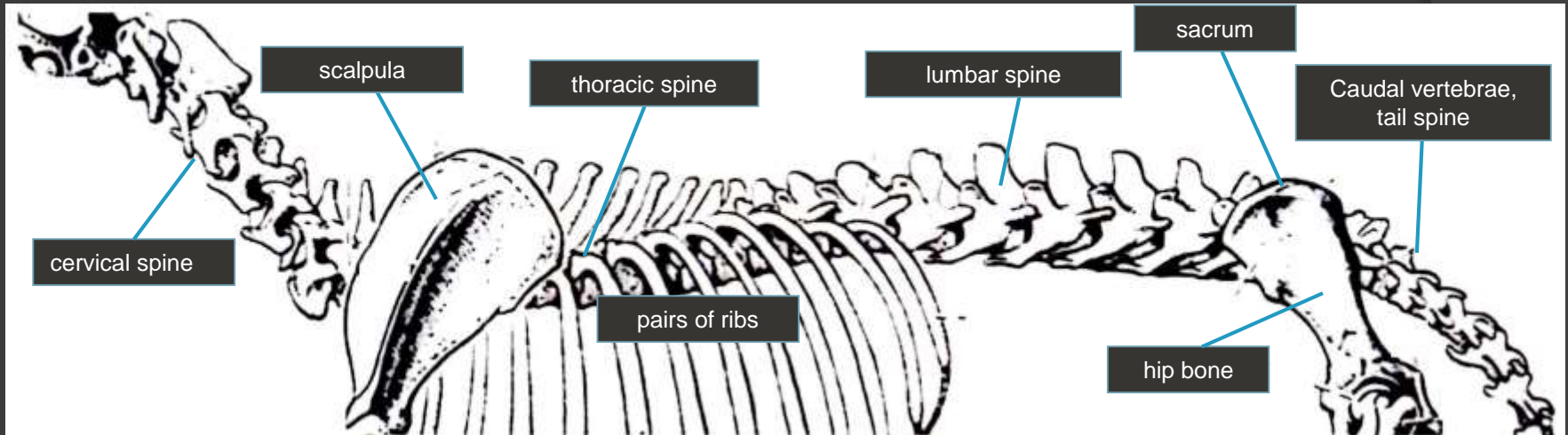
Skeleton of the hindquarters

- 28 *) pelvis
- 29 *) hip joint
- 30 thigh
- 31 Knee (patella)

*) The description of the pelvis takes place in the hindquarters

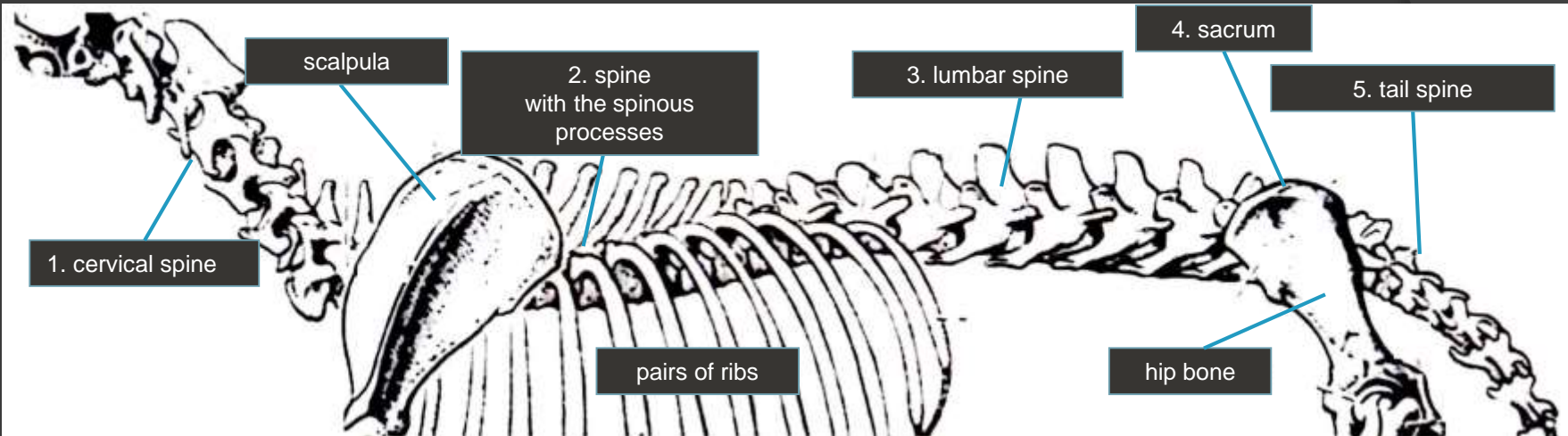
Dashboard

The skeleton of the trunk - the spine



The spine is build of vertebrae which protect the spinal cord and the nerve fiber in the vertebral foramen. The spine is in the center of the body which arises from the pelvis and carries the head on the upper end. On the caudal end of the pelvis (in direction of the tail) the caudal bony basis starts. All vertebrae have a mutual base form; however, in the different regions of the body they are adjusted according to their function.

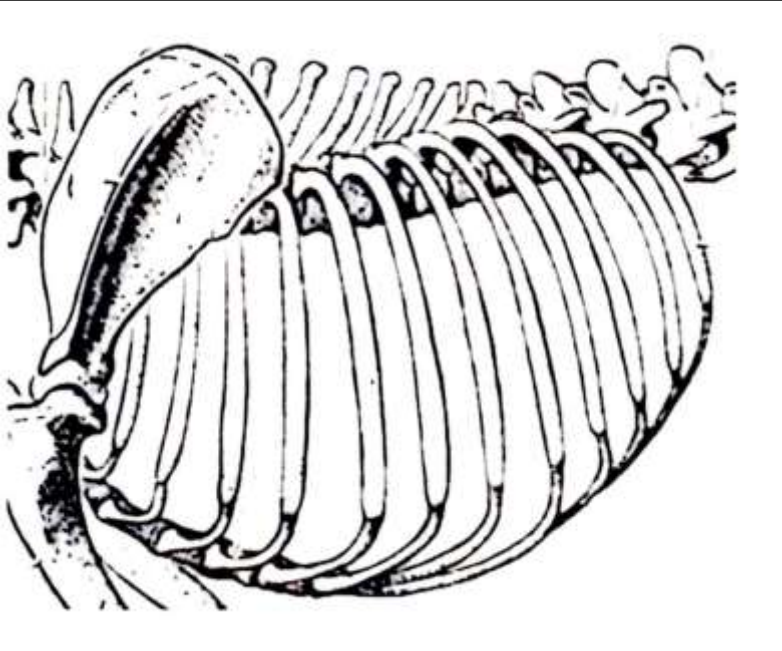
Outline - skeleton of the trunk



The skeleton of the trunk is classified as follows

1. Neck section with 7 cervical vertebrae where the first, the Atlas, carries the head. The second cervical vertebra is the Axis, the „turner“ on which the Atlas rotates.
2. The chest- or spinal segment is of 13 vertebrae; the first 5 thoracic vertebrae with their acanthae build the withers; the last 8 vertebrae are the anatomical basis for the back. The above placed acanthae angle from front to rear.
3. The lumbar segment is of 7 vertebrae; their acanthae are triangular and slope from the rear to the front. The different inclination in comparison with the thoracic vertebrae arises because of the spinal static.
4. Three sacral vertebrae which are conjoined build a homogeneous bone, the sacral bone. This adhesion has a useful reason because the sacral bone is the only segment of the caudal skeleton which is supported from below.
5. The tail consists of several caudal vertebrae (18-22). The caudal vertebrae are connected firmly and have no articular processes.

The chest - Description - function

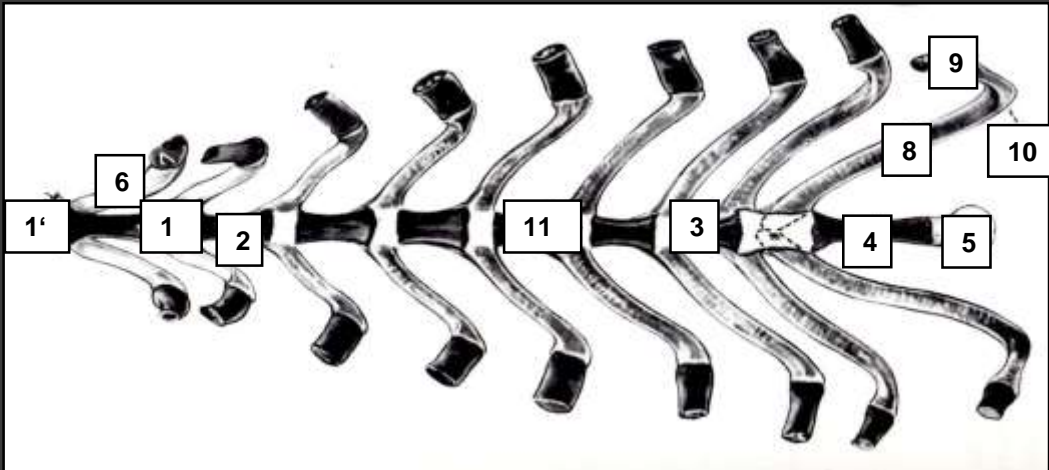


The slightly curved sternal ribs are steep under the spine and firmly connect this to the sternum, grant the thoracic limb with its shoulder blade the basis for connective tissue – muscular attachment.

They become, as so called support ribs, the carriers of the torso between the thoracic limbs. In contrast to these, the asternal ribs (not connected to the sternum) are strongly curved at their edges as well as over their surface span, and are arranged obliquely to the spine and very movable, which creates favourable conditions for the movement of the chest during respiration.
(respiration ribs)

The chest is composed of 13 pairs of ribs. The ribs are flat bones that symmetrically arranged in pairs along the thoracic vertebrae. It is differentiated between true and false ribs. The ribs provide the bony basis for the side wall of the thorax. One differentiates with the ribs, between the proximal (near the body) rib bones and the distal (further from the body's centre) rib cartilage. The cranial ribs(towards the head) are directly connected with their cartilage, to the breastbone (sternum) and are called true or sternal ribs. The cartilage of the caudal (tail end) false (asternal) ribs however, reach the breast bone only indirectly, in that they join into the costal arch. The last two ribs are generally free in the chest wall and are called the floating ribs. Such ribs, ending with their cartilage in the body wall, are called flesh ribs.

The sternum

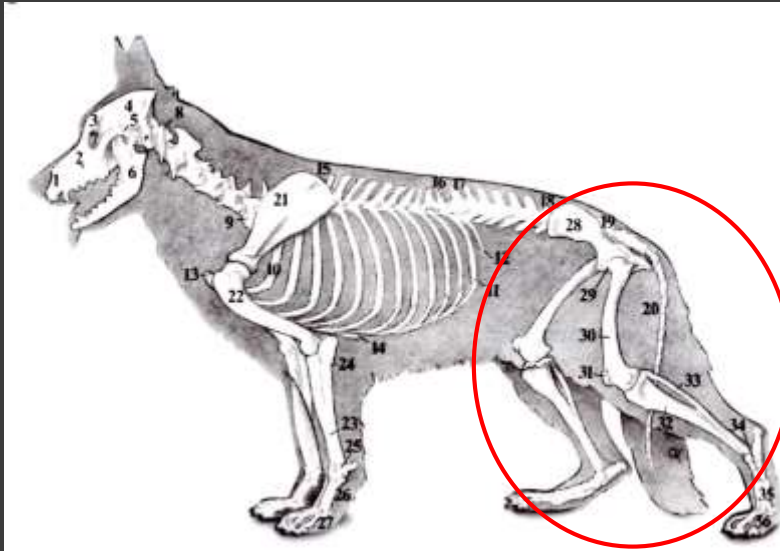


**Dorsal Sternum (breastbone) with distal ends of the ribs
(distal = away from the center of the body)**

- 1 / 1' The sternum (Manubrium sterni) first segment**
- 2 / 3 Beginning and end of the middle segment**
- 4 Xiphoid (3rd segment)**
- 5 shovel cartilage and the third section of the sternum,**
- 6 Cartilage of the rib**
- 8 cartilage**
- 9 Body of the ninth rib**
- 10 costal cartilage**
- 11 Joint, fibrocartilage**

The sternum consists of several pieces of bone (8) which are placed one to another cranial (in direction of the head) to caudal (in direction to the tail) and in the course of time, because of ossification of the cartilage gaps between, become merged. The cartilage of the true ribs are placed at the side of the sternum. One distinguishes between 3 segments of the sternum

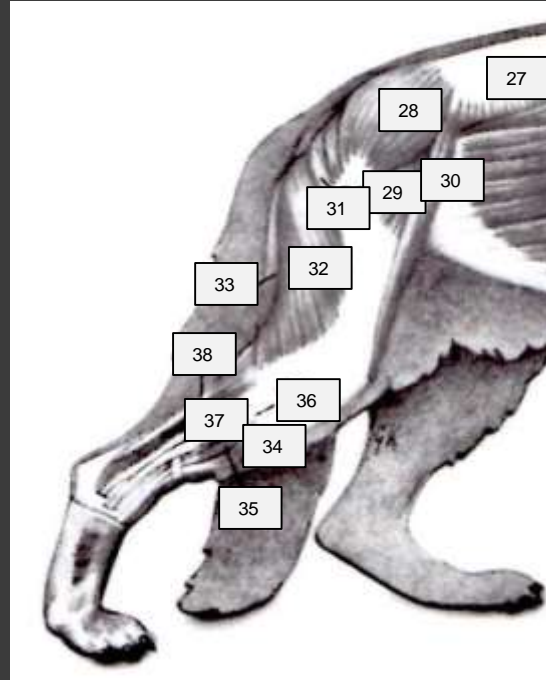
The hindquarters



From the hind-limb skeleton, the pelvis is still very involved in the trunk construction, very strongly muscled and therefore hardly visible. It underlies, together with the sacrum and the first caudal vertebrae, the croup, and offers the very strong croup- thigh and ischiocrural muscles the most important points of origin and is in connection also with the thorax through the abdominal muscles.

Only the hip and ischium are perceptible and help us to get an idea of the lay and length of the pelvis. The ischial tuberosity provides the fixed point for the determination of length of trunk. The hip joint is because of the strong musculature, not easily located. Through careful palpation at least the large trochanter major of the femur bone and approximately the centre of rotation of the hip joint is found. Otherwise the femur lies deeply in a mighty muscle mass and only surfaces again in the area of the knee joint. The location of the knee joint can only be ascertained approximately with the eye, through palpation of the knee cap, the patellar ligament, the outer condyle of the femur and tibia, however, it can be determined very accurately. Thereby the fixed points for the determination of the hip and knee angle are given. In the region of the lower thigh, pastern joint, the pastern and the toes, the skeletal parts are again very superficially placed, where the pastern joint is especially well marked by the calcaneal tubercle.

Hindquarters Muscular and bony structures



Muscles of the hindquarters

28 medium croup muscle- m. gluteus medius

29 Tensor fasciae latae

30 sartorius m

31 superficial croup muscle

32 two-headed thigh muscle m. biceps femoris

33 half tendon muscle, m. semitendineus

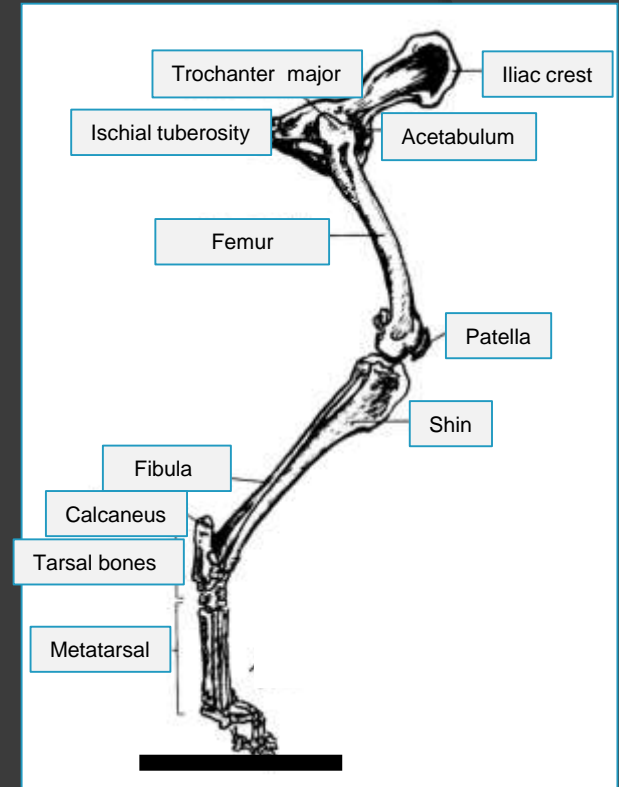
34 frontal shin bone muscle, m. tibialis anterior

35 long toe extensors

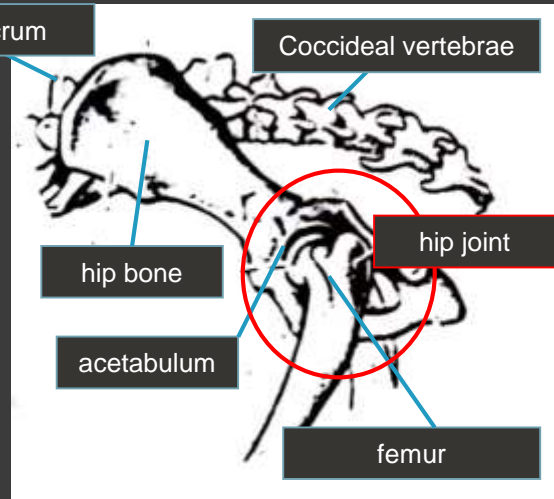
36 long calf muscle

37 Deep toe flexor muscle

38 Heel tendon strand

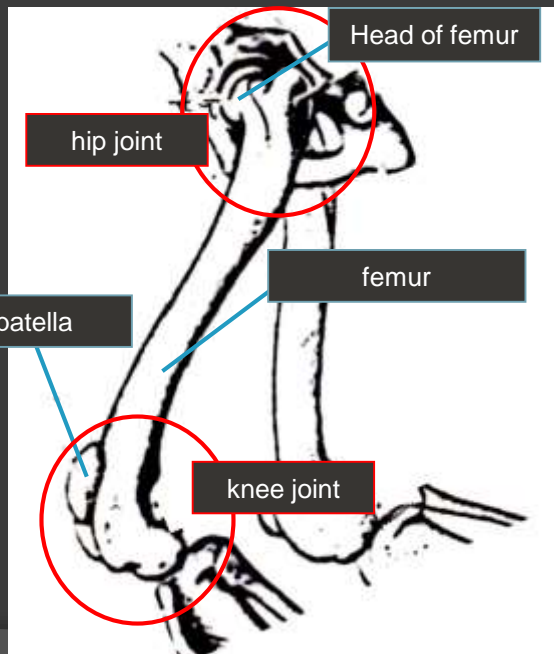


Pelvic girdle – upper thigh



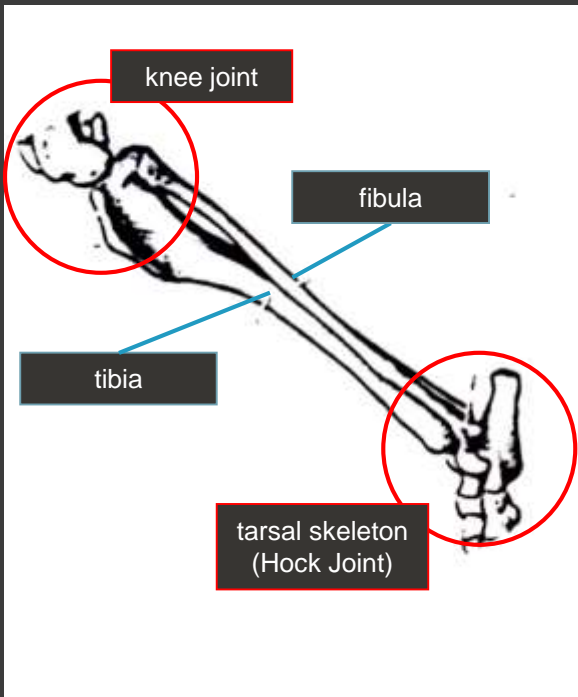
The pelvic girdle serves the connection of the pelvic limbs to the torso. The pelvic girdle consists of the hip bone, where in the young dog the division into 3 individual bones can still be seen. The ilium, pubis and ischium. These 3 Bones meet in the pelvic socket (acetabulum) The joint cartilage still found at youth, ossifies later.

In the adult dog they have finally formed a unified hip bone.

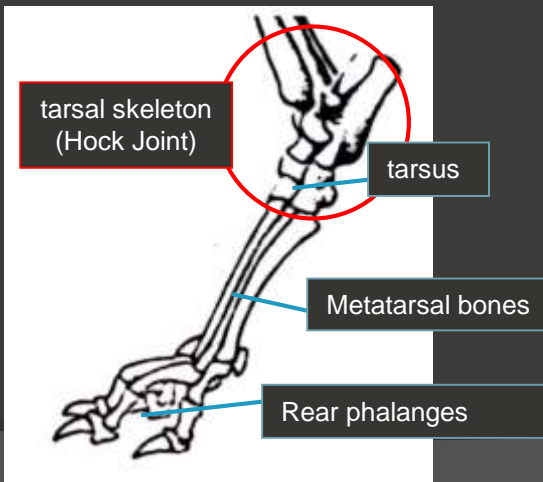


The skeleton of the thigh is formed by one bone, the thigh bone. It also represents the bony connective link to the pelvis. The femur is the strongest bone of the skeleton. It outperforms the humerus because in addition to the support function, in particular, the forward thrust must be accomplished. Due to the varying muscle performance for the forward motion of the body, and as a result of the loading through the body weight, the tuberosities, grooves, and trochlea act differently. Proximally the femur is the articulated connection with the hip joint, distally lies the knee joint with the patella.

Lower thigh - Hocks



The skeleton of the lower leg is the distal limb of the hind pillar of extremities; two tubular long bones – medial the stronger tibia and lateral the weaker fibula. Those two lower leg bones differ from the lower arm bones in that they are not able – like radius and ulna – to rotate against each other; so they are also not crossing. They are nearly parallel to each other where the fibula does not completely reach the knee joint (the knee joint is incongruent). The somewhat longer tibia carries the body weight. The proximal end is fused together with the tibia. At the distal end a two-parted fulcrum screw absorbs the flexible apposition of the tibia with the tarsal skeleton (hock joint).



The skeleton of the hind leg (autopodium) consists, like the forefoot, of three identical segments; namely the tarsus (three lines of bone), the metatarsals (five bones) and the 4 hind toe bones, phalanges.

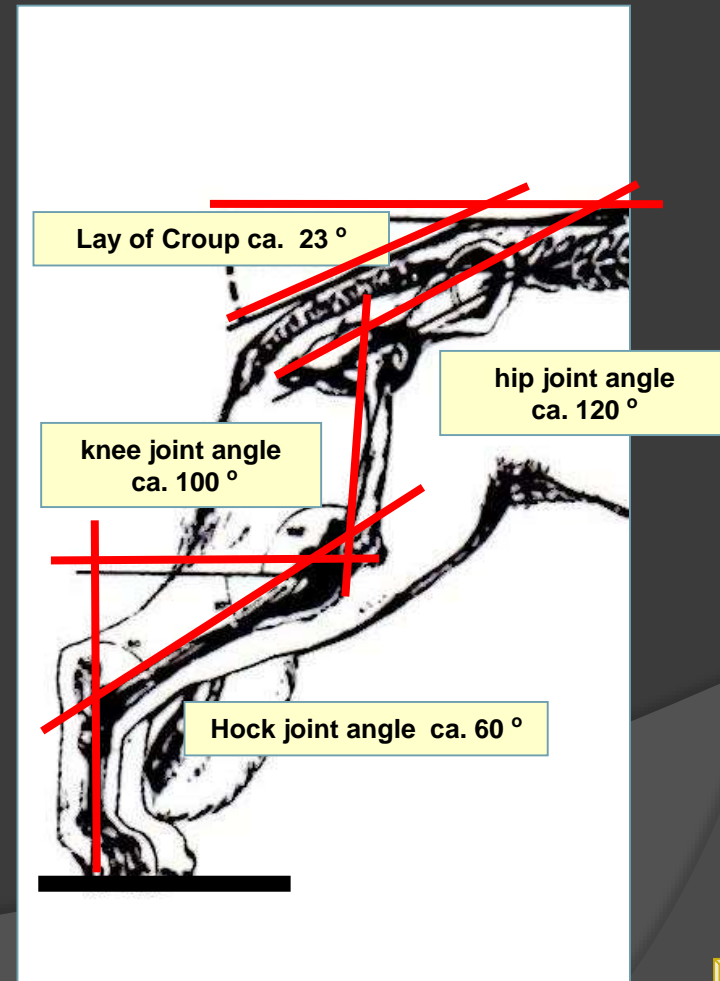
The hindquarters - Structure - angular positions



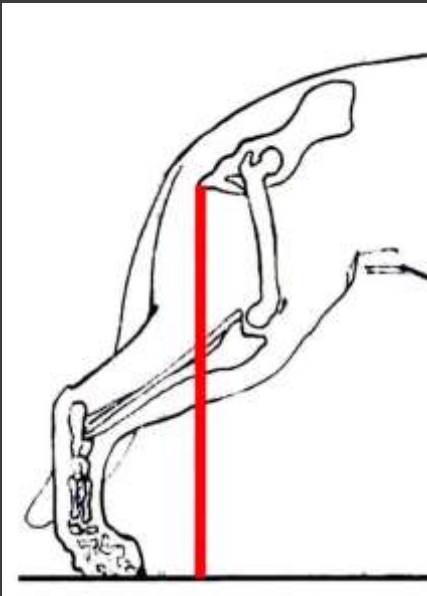
The back extremities show more than the picture of a stronger angled mortise- or throwing system. The lower leg, consisting of tibia and fibula is not vertical like the lower arm, but aslope to the rear - downwards.

Hip and knee angles behave similarly to the corresponding angle of the front limb, ie they vary breed specific in their angle. Whilst the pelvis (hip angle) is still within the trunk area, the upper thigh (knee angle) is already a free limb. A horizontal imaginary line extending from the knee joint center forms a right angle of ca 90 ° with the perpendicular standing hock.

The open to the front hock joint angle of about 60 ° is formed by the lower thigh and the composite of 7 smaller bones of the tarsus or hock joint.

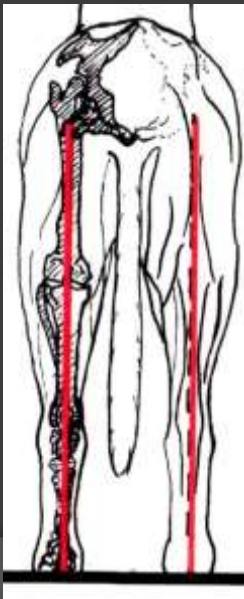


Fulcrum lines of the pelvis extremities



The fulcrum lines, of the pelvis extremities are analyzed from side and back view.

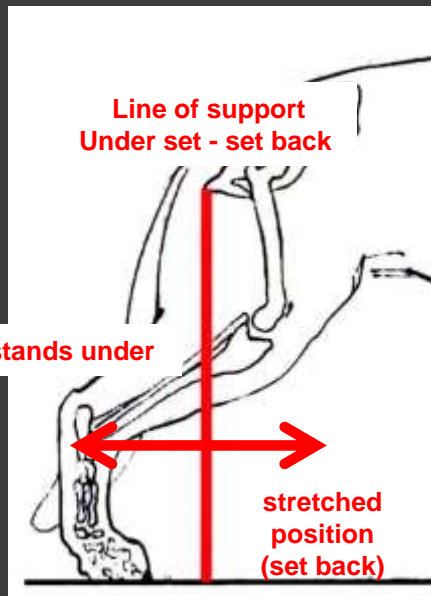
1. **Side view (profile):** In profile the hind legs have only one fulcrum line. It starts at the ischial tuberosity (point of buttock) and has to touch the ground directly in front of the tips of the toes while forming a vertical line which is parallel to the hock which always and in every case stands in a vertical position on the ground. In Breeds with very long bone segments like the German Shepherd Dog, the fulcrum line touches the ground in front of the paws at a distance equal to the length of the foot seen in side view. The German Shepherd Dog stands with hocks slightly set back.



If the line of support meets the ground behind or almost behind the foot on the ground, the dog “stands under”. (under set)
In the case of being under set, the centre of gravity shifted too far to the rear, the Pelvic limbs are therefore more heavily loaded, which negatively affects the speed.

2. **Viewed from behind,** there is only one line of support that starts at the ischial tuberosity and divides the complete hind leg into two equal halves as it falls in a vertical line; that runs through the upper thigh, the lower thigh (2nd thigh) the hock and the foot, before it meets the ground.

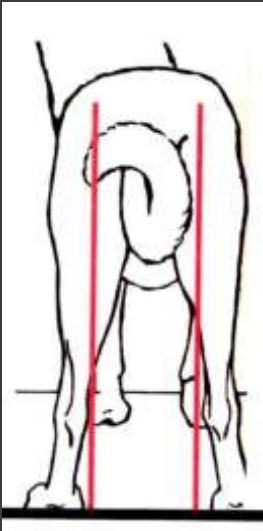
Fulcrum line seen from profile



If the line of support meets the ground behind or almost behind the foot on the ground, the dog “stands under”. (under set)
In the case of being under set, the centre of gravity shifted too far to the rear, the Pelvic limbs are therefore more heavily loaded, which negatively affects the speed.

If the opposite is the case, and the line meets the ground in front of the foot, one speaks of a set back or stretched position, which corresponds with an incorrect placement of the hock, that instead of vertical (plumb), as required, extends back obliquely. In the case of such stretched position, the centre of gravity is displaced to the front, the shoulder limbs and the back are more heavily loaded.

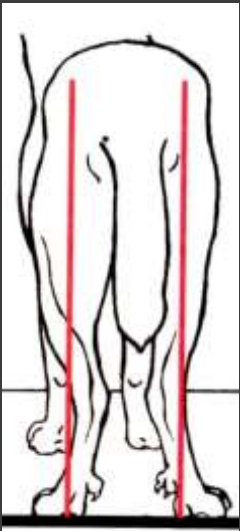
fulcrum lines seen from behind - deviations



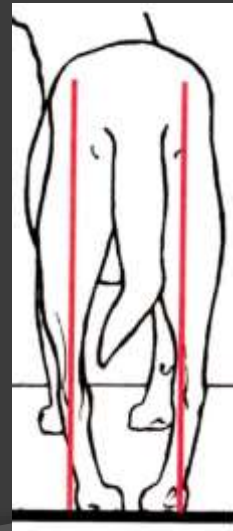
Too great a distance between the hind legs. If the pelvic limbs are outside the lines of support, this results in the hindquarter stepping wide.



If the pelvic limbs are inside these lines, this is described as stepping narrow or moving close.



If the legs are within, the feet however, are outside the lines of support, then one speaks of cow hocks.



If the legs are outside and the feet within the lines of support, we are dealing with bow hocked, barrel, or bandy legs.

Movement – Locomotion - Gravity – center of mass

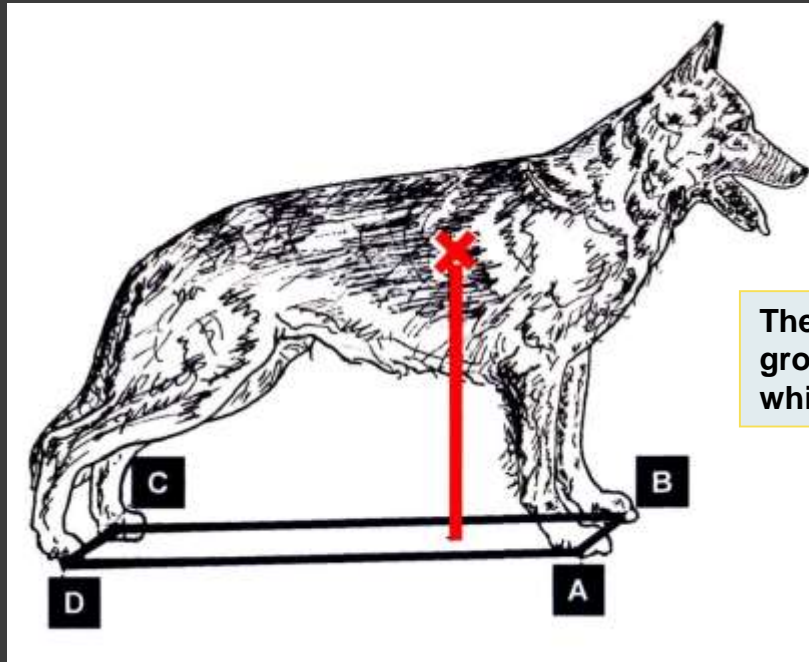


In order to understand the mechanics of the dog's movement one has to be clear about some important points which are crucial for animal motion. Many are of the opinion that the muscle power plays the crucial role in forward movement. In reality it is unthinkable that the forward thrust of the body, that gains a considerable weight in certain breeds, can be only and solely attributed to the action of muscle bundles. No muscle mass compatible with the dimensions of a dog could achieve such work over any length of time. From these reflections a rule is determined that has the deciding attribute for the movement, that is, however not given the value it deserves. It is the first law of mechanical physics, that describes gravity and simply but fundamentally influences the animal physique and its movement, i.e. everything that moves or pauses in balance, is subject to the law of gravity. It is therefore the law of gravity, that creates the problem movement, as gravity also weighs down each body. But it is gravity itself, that also solves the problem.

Center of gravity



As can be seen from the picture a rectangle can be drawn with the ends at the points where the dog supports its limbs on the ground. The four corners are named A, B, C and D.



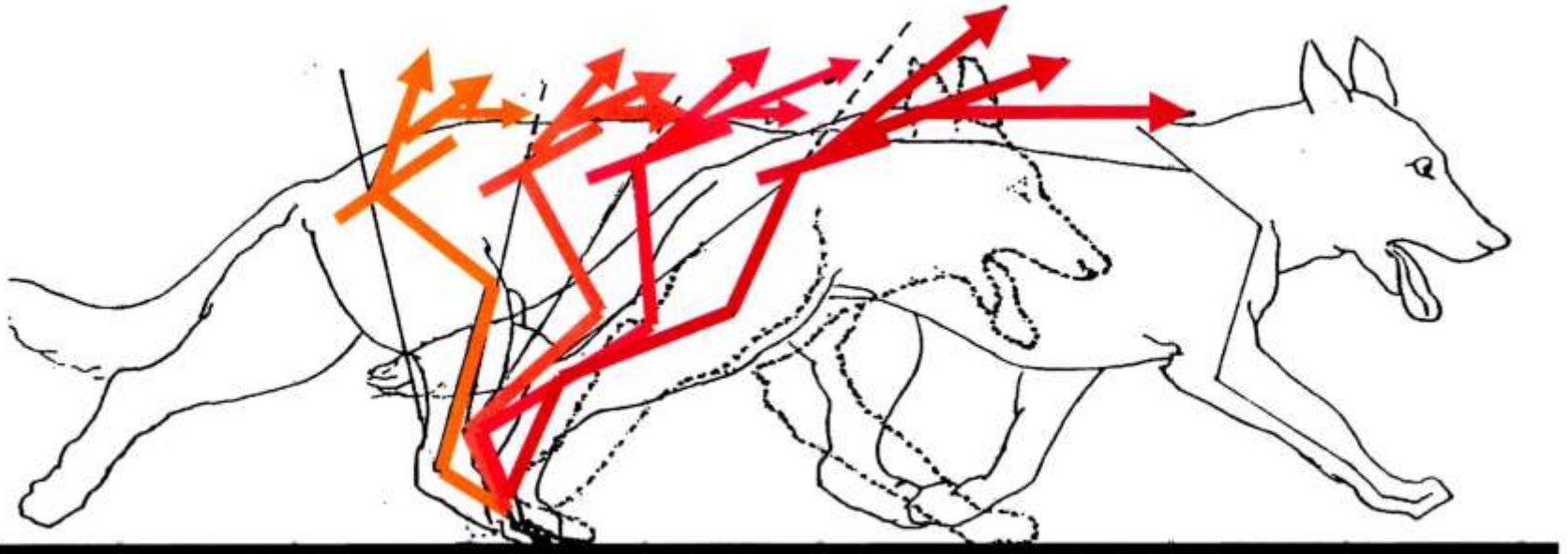
The vertical from point X to the ground touches this rectangle which is also called bearing surface.

It is important to know that each body has a center of gravity or balance point. At this point (X) all gravitation lines, the gravity lines of the body itself, meet. This point is located centrally in the animals trunk. However, the position of the center of gravity is not constant. For example when the head is lifted or the tail stretched out, it correspondingly moves forward or to the rear. The balance and accordingly the static position is only possible as long as this line touches the ground within the bearing surface.

Forward motion (propulsion)



When the dog shifts his body mass forward by stretching his neck on a horizontal line and moving the head which acts as rocker arm forward and downward, he displaces his own center of gravity outside of the bearing surface in front of the line A-B in the foregoing illustration. The power which initializes the movement at first is the muscle energy of the hindquarter, as the animal moves his own body upwards and then forward.

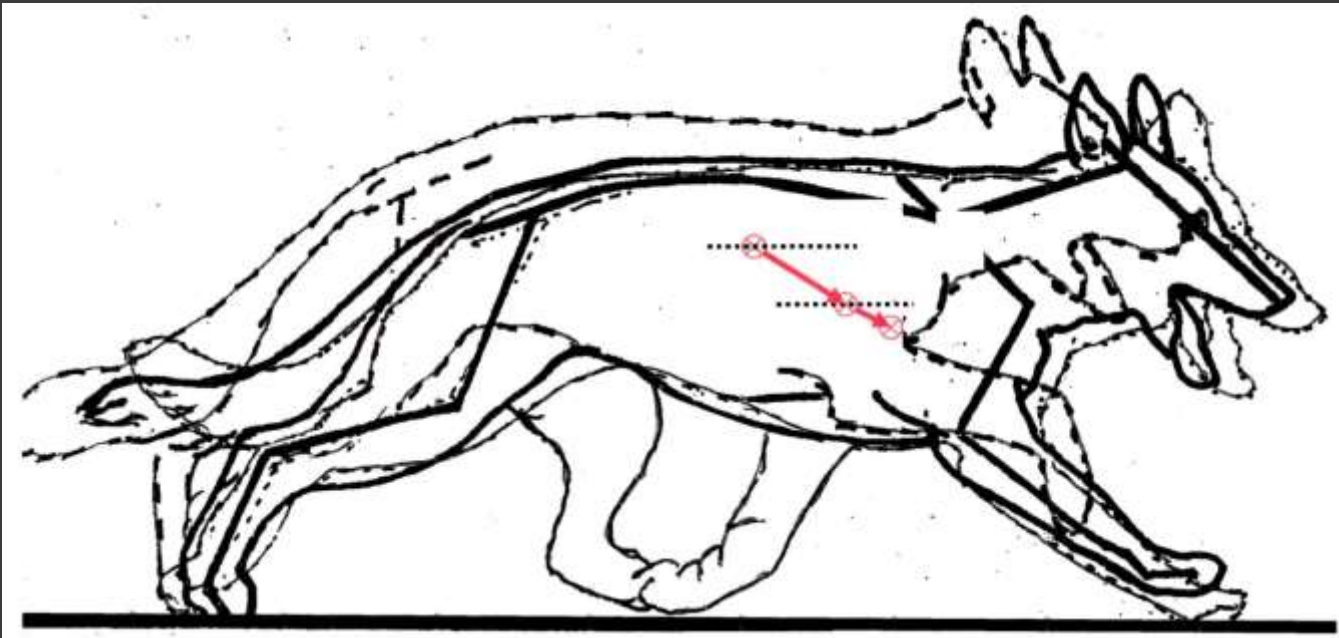


Action of the hindquarter in 4 following phases

Displacement of the center of gravity



From this moment the forward motion of the body is achieved mainly through gravity, as the center of mass reaches a sloping, steeply downwards angled line and through this the body gains speed. The dog reacts at once and brings first one and then the other foreleg to the front in order to place the center of gravity inside the bearing surface.



From this, it is clearly seen that the shift of the centre of gravity initiates the forward movements of the dog, is certainly connected with an initially acting propulsive strength of the hindquarter, but mainly a shift in the center of gravity ensures that the body mass will be taken forward.

The locomotion - the support phase



The locomotion of all four footed animals is based on the same principle. In each case the four legs will be lifted from or placed on the ground in a specific sequence. But also the course of motion of an extremity follows a specific rhythm. The hind legs have a special importance for the impetus to move the body. The course of motion is regulated through a series of nerve centres, that have a hierarchic structure and coordinate the motion process on several levels in such a manner that every major centre controls and integrates the minor centres. The orders are sent from the main movement centre via various minor centres, finally to the individual muscles of the trunk, extremities, tail and so on.

The individual movement is comprised of two phases of movement, the support (Stance phase) and the swing phase.

The support phase is the point when the foot touches the ground. Functionally the stance or support phase is divided into the paw touchdown, weight transfer (support) bracing, and paw push-off.

When the dog places his feet he touches the ground first with the tips of the toes, which means claws, then with the pads of the toes and at last with the pads of the sole; when the foot leaves the ground the process is reversed.

The touch down is followed by the weight transfer or support, recognized by the foot pressing right down (spreading toes, and pressure on the pads of toes and sole)

The locomotion - the swing phase



When in the course of the forward movement the plumb line touches the ground from the shoulder- or hip joint in front of the tips of the toes of the limbs, the bracing connected with stretching of the extremities begins. Then follows the lifting. In the support phase the paw is a fixed point for moving the extremities forward.

The swing phase is the time during which the limbs do not touch the ground. Their analysis gives Spatio-temporal and spatial data. During a movement sequence the speed of the body is constant. In this time however, the speed of a supporting limb is zero. (Remains at one point). In order to make up for the loss of speed, the average speed in the swing phase has to surpass the total speed considerably. Regarding the speed in the process of the swing phase as well as the form of the swing arcs described by the paws, you can differentiate between three sections.

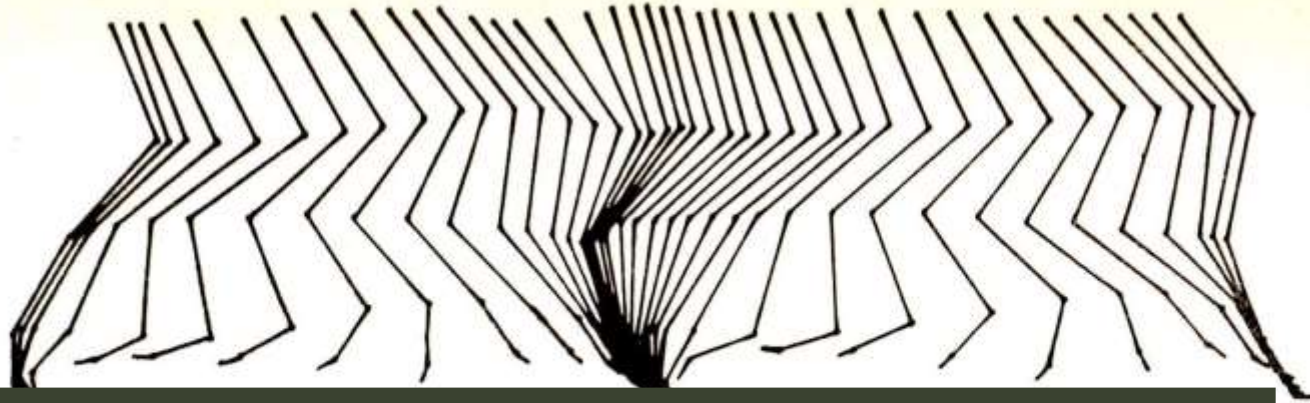
Firstly the limbs swing up in the early swing phase with great acceleration and in a steep arc differing in the fore- and hind limbs, in order to, in the middle phase, the actual swing phase, more or less regularly and with an upwards slightly concave arc continue the swing and finally in the late swing with strong breaking, in an arc each characteristic for the front or hind limbs, to complete the swing phase and to prepare for the next touch down.

During the gallop each limb describes its own arc, which is not completely identical with any of the other limbs. The length of the swing arc too, is of a characteristic size for each movement. The span comes to different lengths in the walk, during pacing, during the trot and the gallop.

Placing – Swinging phases walk



Forelimb Modified joint angle demonstration



Placing phase 1

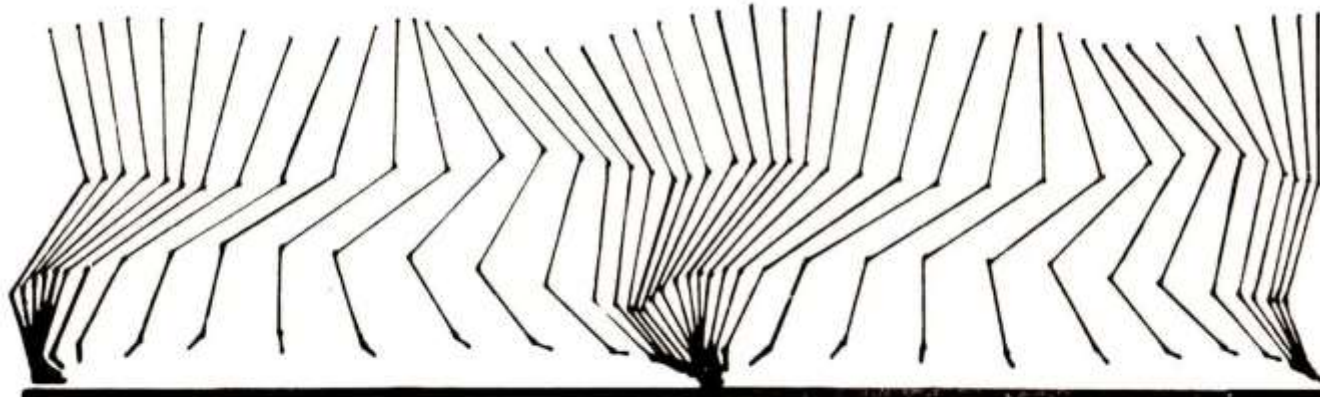
Swinging phase 1

Placing phase 2

Swinging phase 2

Placing phase 3

Hindlimb



Placing phase 1

Swinging phase 1

Placing phase 2

Swinging phase 2

Placing phase 3

The locomotion - General



While we are at the subject „movement“ we want to talk about the different gaits. The five different gaits are:

1.Walk

2. Pace

3.Trot

4.Gallop

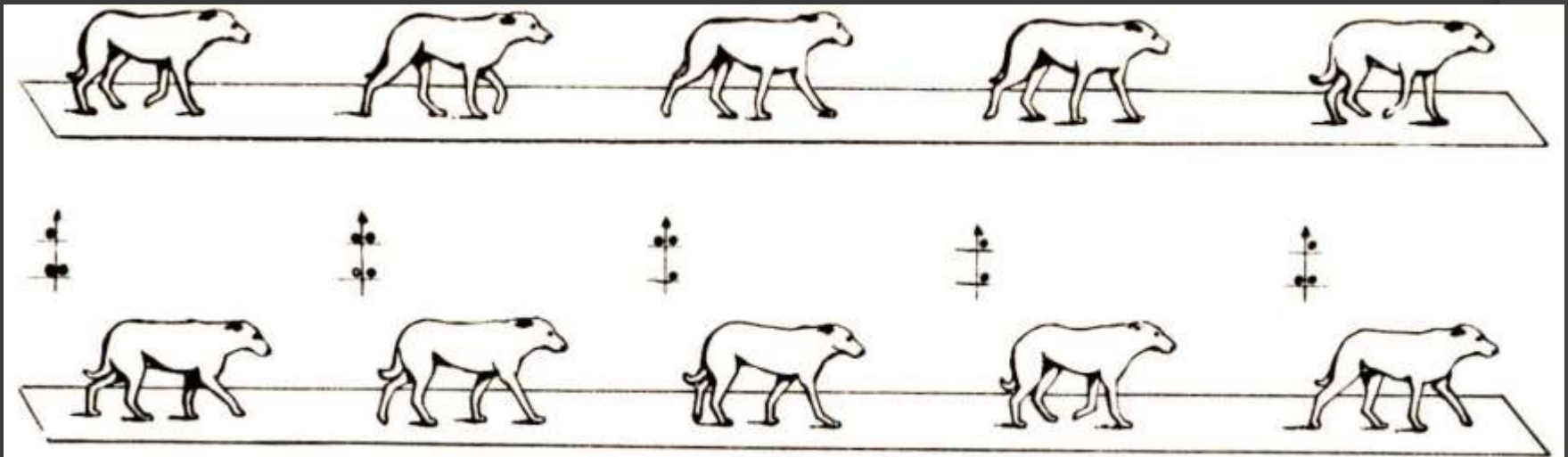
5. Jump

The entire body of the dog is made for moving forward. This impulse, also known as propulsion develops in the hindquarter and is transmitted via the croup and the spine. This impulse is always the first act to an effective drive of all forward motion. The walk is an equilateral sequence, following from the rear forward, alternately on both sides. When the dog walks the move which absorbs is actually the reduction of the bearing surface; which the dog brings about by lifting one foreleg off the ground so that the quadrangular bearing surface with one foot at each corner becomes a triangular and therefore half as big a surface. Because of the one-sided front brace the balance of the dog is disturbed and a little move is enough to displace the balance outside of the bearing surface. This impulse from the hindquarter is activated after the dog the dog reduces the bearing surface by lifting the extremity which is done through contraction of various muscles (triceps surae, as well as the middle foot extensor and the tarsus, which moves the heel forward.) The leg is stretched so that the pelvis extremity becomes nearly straight. This causes the displacing of the center of balance to the front which affects also the trunk. So the trunk is pushed to the front and the body mass point is transferred further to the front. In order to not fall on the ground the dog has to move his previously lifted foreleg further forward so that the center of balance is transferred into the bearing surface. When walking the dog is most connected to the ground. The four extremities move, one after the other; in doing so two if not three limbs support the body. Because of this the walk is the least exhausting gait of the dog.

Types of Movement : The walk

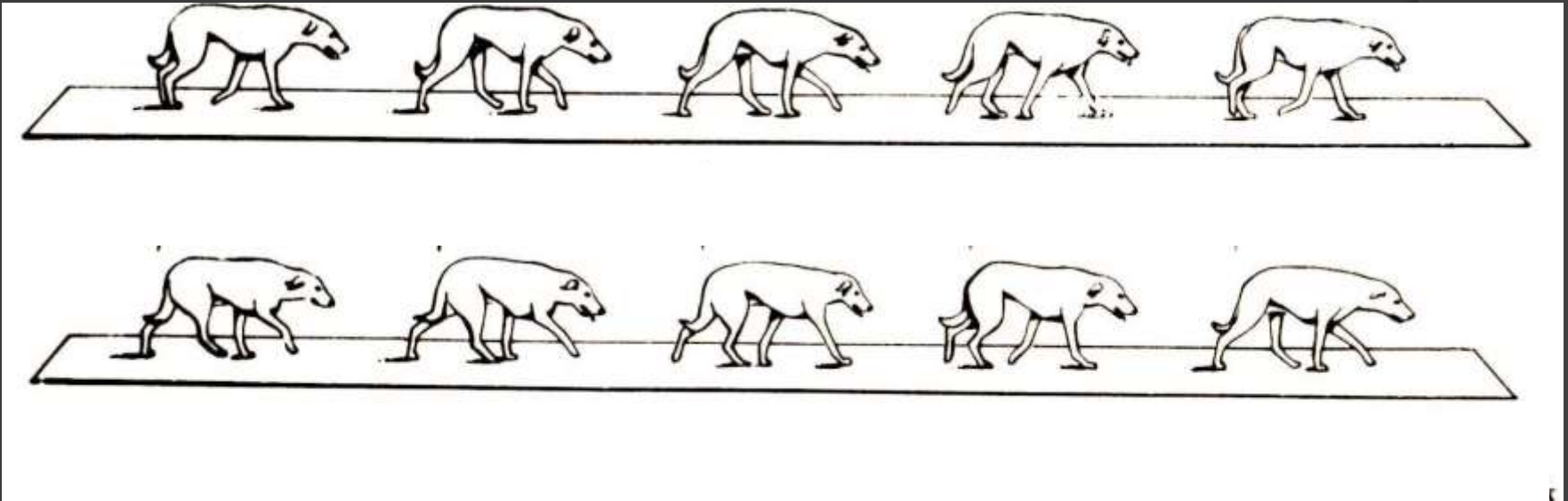


The walk is an autonomous kind of movement with different submoves; slowly, medium fast and the fast walk.



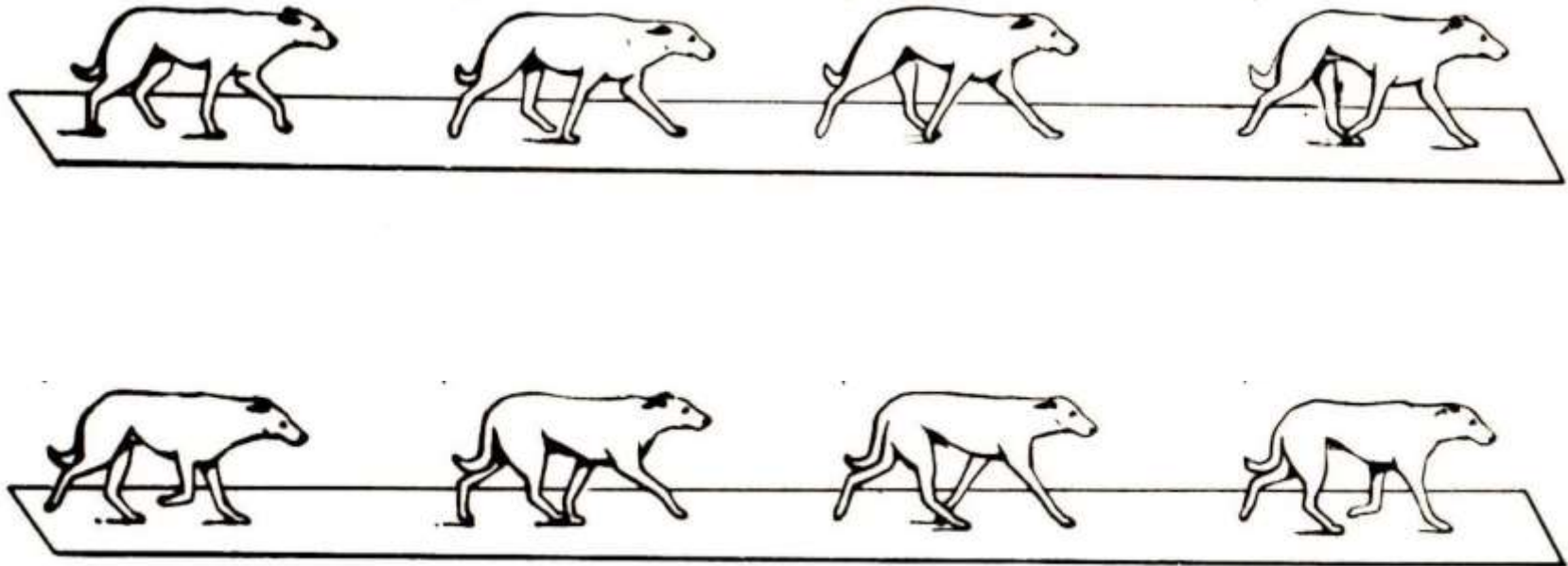
In the phases of varying speed of movement sequences, where for instance, the foreleg is already lifted before the concurrent hind leg has reached the ground again, there are only two, instead of three legs on the ground. During this time, the body glides to the side for a few moments, or angles diagonally forward, until the third leg supports the triangle again.

Types of Movement – the pace



In the true pace the fore and hind legs of the same side are moved simultaneously. The pace give a transition from the slower to the faster running moves. Depending on the speed reached, once can differentiate between a slower, unclear pace (amble) and a fast, almost clear (true) pace, wherein the former is counted with the pace-like walk, and the latter with the running gaits. In the pace like gait (the amble) the hind-limb sets down a little earlier than the fore foot. This results in a very short hind and front three leg support being slipped between the longer phases of the pace with one sided support.

Types of Movement : The Pace run (fast pace)



The walking moves differ from the running moves in that the swinging phases of the running moves are longer than the placing phases and therefore a change of the phases occurs in that they coincide over a shorter or longer time, creating a levitation phase. Because of this we can allocate the fast pace to the running gaits. The motion sequence starts with a hind leg which is followed by the same side fore leg. Instead of a levitation phase, a slight touch of the ground by diagonal legs results. The displacing of the center of mass increases predominately in a horizontal direction as the body weight has to be transferred twice from one side to the other within one sequence of movement.

Types of Movement or Gaits – the trot



The German Shepherd Dog is a trotter. He must be able to trot long distances with minimal effort. A prerequisite for this is an anatomical structure according to the standard combined with a dry, strong musculature. The medium trot is the most natural kind of movement for the German Shepherd Dog.

The characteristic of the trotter is his capacity for far reaching steps so that in motion, the imprint of the hind foot is in the imprint of the fore foot or, even better, before it.

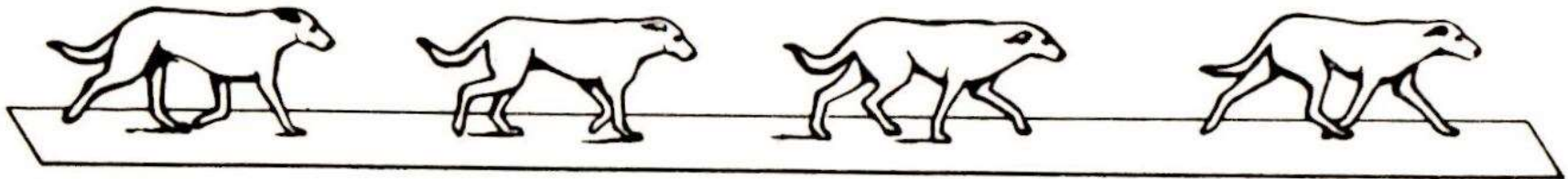
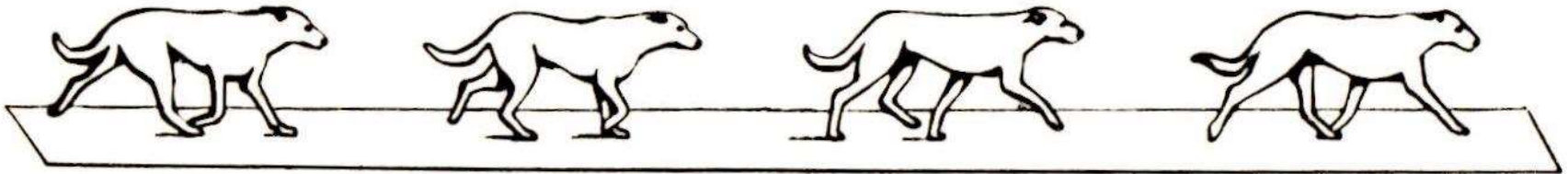
When you keep in mind that the animal is of rectangular build, and therefore the fore legs compared with the hind legs are even further away you can conclude that only a stronger angulation of the pelvis extremities in the stretching phase allows them to meet the imprints of the fore foot or even to top them. A stronger angulation allows longer bone segments of upper and lower thigh bones.

Therefore, the trotter is characterized through a more pronounced angulation of the hind quarter. A direct consequence is that the croup also has to be more sloping. The reason for that is so that the gluteal - and the tibial muscle can then develop the optimal power. A further characteristic of the trotter is the length of the croup because this is the lever arm of the power when moving forward. As a direct consequence of the tighter set of angles in the hindquarter we see, logically, the tighter angles of the forelimb column. For if this were not the case, then the far reaching pelvic limbs would not correspond to the far reaching shoulder limbs. As the trot depicts a harmonious movement, it is quite impossible for instance, that the hind legs take a certain number of steps, whilst the forehand needs to take more steps. During movement, the trotter takes up an almost horizontal position. The forward movement initiated by the hindquarter, is transmitted over the croup and the back, to the forequarter.

Types of Movement or Gaits – the trot



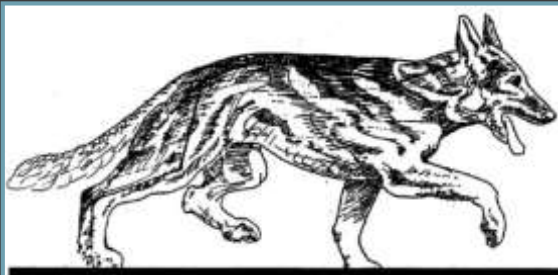
Therefore the length and lay of croup and a short back are of great importance for a good trotter. The trot is a faster gait than the walk. During the trot the motion sequence of a single limb can be effortlessly followed by the eye in spite of greater acceleration, because it is a simple diagonal synchronism, i.e. the diagonally paired limbs work together with such precision, that they are always in nearly the same phase during the whole sequence of movement. The centre of gravity here, is solely supported by diagonal two-leg-props, which change between back left- front right, and back right – front left.



Sequence of Step during the trot

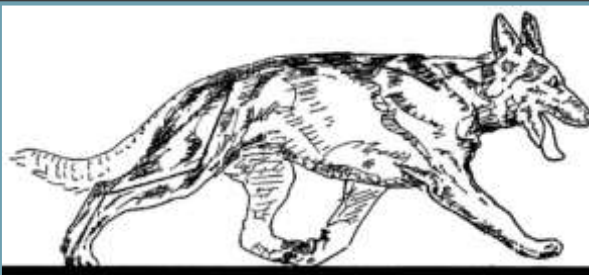


On these three pictures three positions of the trotter are shown. These explain the mechanics and the lines on which the impulse of the hind quarter is passed to the forehead when trotting, and from there is accordingly transmitted by the footfall.



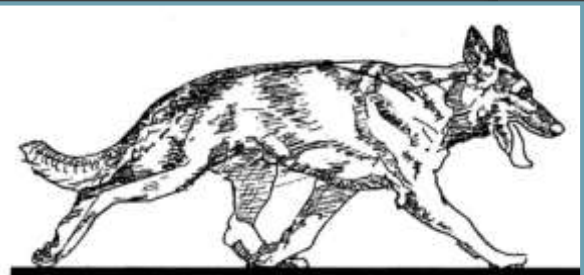
Push

This picture shows the position of the dog in the phase where the propulsive power gives a strong push to the hind quarter.



Stretching

The dog receives a thrust upwards, as shown in the picture above, and then subsequently, through the shift of the centre of gravity onto a vertical line, reaches the stretch phase.



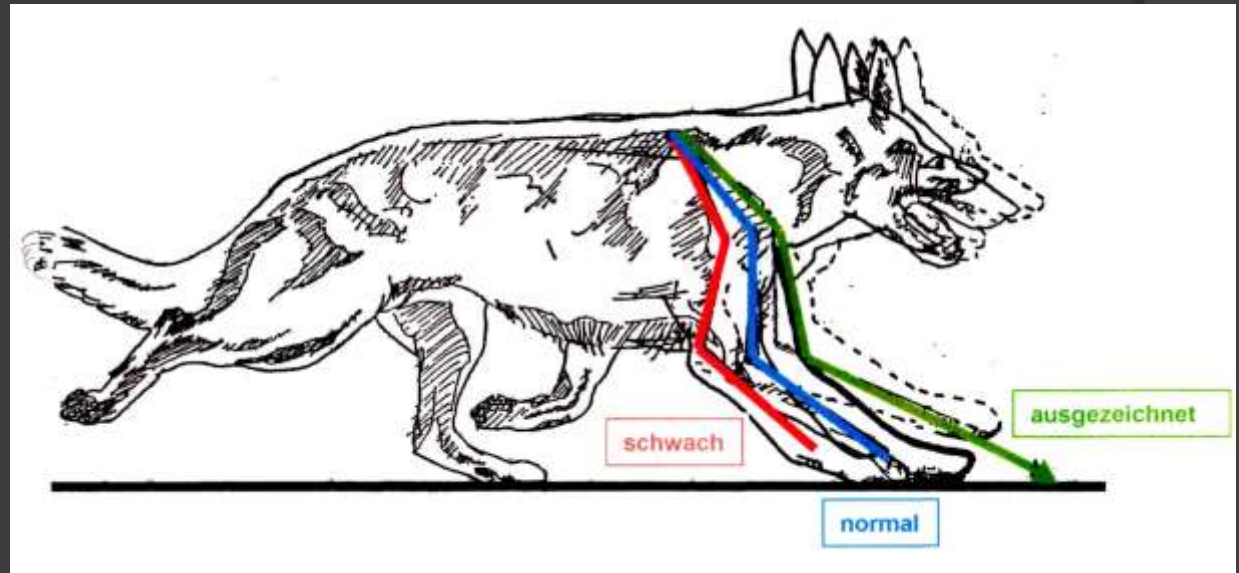
Support Phase

The picture shows the footfall stage of the given forward push.

Different shoulder placements



The dog can perform the desirable large step with the fore hand, if the bones of it are long and the scapula and the upper arm are well angled to each other. The scapula turns while moving around a point somewhat in the middle. This means the longer both these bones and the more angled their placement, the greater the freedom of shoulder movement.



The continuous red line shows an open bead seat angle. The scapula is placed too steeply angled to the side of the thorax. The hereto joined upper arm is too steeply angled, shows a too steep angulation of the limbs with little freedom of shoulder and short in reach. Restricted.

The blue colored line shows the movement possibilities in the same phase of motion with a good shoulder.

The green line shows the result of excellent angulations of the forehand, which permit a far reaching movement of the limbs of the shoulder.

Types of movement – the gallop



The gallop, the fourth of the main movements, differs significantly from the three foregoing ones. Whilst in all other types of gait the movement of both body halves is symmetric, they are asymmetrical in the gallop. The individual movements of the four limbs and the actually present levitation phases are joined to form a complete pattern of movement.

As in the walk, in the gallop too, one can under consideration of the speed, observe three sub categories: the slow, the medium and the fast gallop. In the sequence of steps too, the varieties can be differentiated, they do however overlap with their respective speeds. Therefore, they are not listed as separate groups but they help to further classify the grading per speed.

The slow gallop has two variations:

The Canter or lope, is a light, casual gallop which serves to loosen up and relax. It is a transitional form at which after the levitation phase, first one rear foot strikes the ground, then the second rear foot, at which the diagonal front foot simultaneously strikes the ground, and finally the second front foot strikes the ground.

The slow gallop leading with the right, where the diagonal front foot strikes the ground a moment later.

The medium quick gallop can also be presented in two ways:

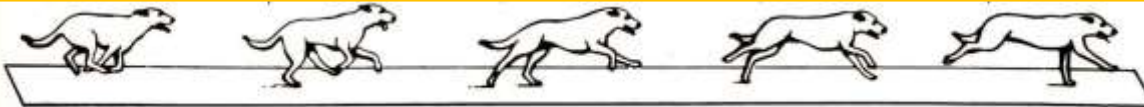
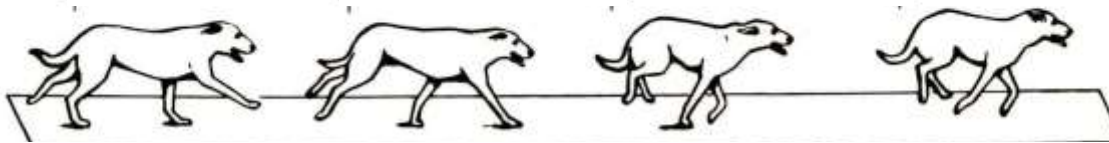
1. As the gallop leading with the left, with the constant change of the supporting side, i.e. HL, HR, FL, FR and again HL, with alternating foot sequence.
2. As the gallop leading with the right with cyclic foot sequence, HL, HR, FR, FL and again HL.

The quick gallop is only performed as left side gallop with cyclic foot sequence. HR, HL, FL, FR and again HR.

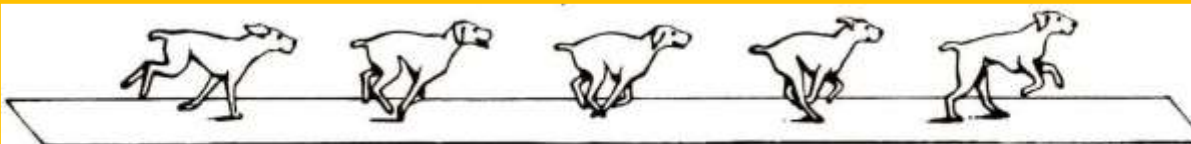
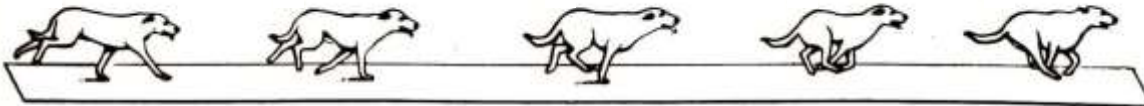
Movement – gallop



Slow gallop



Medium fast gallop



Fast gallop



For a dog the foot sequence for a cyclic gallop, i.e. a gallop leading with the right, is different to the horse, beginning with hind left and ending front left. Regarding this foot sequence it is assumed that, with such a high speed, a change of support via the medium diagonal is not necessary or would even block the forward move.

Movement – the Jump



The jump can be performed out of the stand or, easiest however, out of the gallop; because its motions are a slightly modified galloping jump. It is collected into the slow and medium fast gallop into the middle diagonal and disrupts it. In a fast gallop, the jump is performed instead of the second suspension phase. The suspension phase, normally found in the slow and medium fast gallop is interrupted with a further forward thrust of the rear limbs under the torso, and taking up of the body weight. Meanwhile the head and the whole front of the body have been raised up high by pushing off with the front legs and above all with help of the strongly tensed musculature of the back, thereby reducing the speed somewhat. Through quick and powerful stretching of the hind assembly the body, as soon as it is sufficiently raised, is thrust forward and upwards. Whilst the body is flying towards the obstacle, its axis is angled upwards. The forelegs are, most likely to lessen the air resistance, taken up as close as possible, towards the far foreward stretching head. When above the obstacle, the axis of the body is in the horizontal, in order to then lean strongly forwards and downwards. During this the forelegs are brought down in order to absorb the weight of the body whilst landing. The head however, is raised, presumably in order to lessen the speed and to shift the point of balance toward the rear. The hind legs set down closely behind the forelegs after the jump, and after touching the ground generally continue in the gallop of before the jump. The posture during the jump is seemingly breed specific and variable.

The jump

