

# Lecture by Louis Donald, presented to the members of the German Shepherd Dog Club of Victoria – Australia 2012

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## The History of the Breed

- The breed originates from a very diverse and quite motley assortment of German Sheepdogs that were scattered all over Germany. They had a wide variety of coats, short to long, shaggy and straight to wiry and all sorts of coat colour. Even white non albino, that is white with dark eyes and indeed at the time this was a popular colour for German Sheepdogs.
- Descendants – most academics favour all dogs as being descendants of the wolf and contrary to some minority opinion dogs can be crossed with wolves. Max von Stephanitz wanted to distance the wolf from the German Shepherd Dog as the wolf had some very undesirable characteristics associated with it but he favoured the look of the wolf in his blueprint for the German Shepherd Dog – in effect he wanted his cake and eat it too.
- The early ‘German Sheepdogs’ were exhibited at all breeds shows; records show that the first two were exhibited in 1882 in Hanover. One was grey and white and the other was white.
- A club was formed that would utilize the best of the Sheepdogs to develop a superior German Sheepdog that would be called ‘German Shepherd Dog’. This club was the Phylax Society [guardsman] and was formed in 1892 but it disbanded 2 years later in 1894 due to infighting mainly associated with its members being split between some wanting to develop working dog traits and others preferring developing show dog traits. Nothing has changed in over 100 years!
- Max von Stephanitz who was a cavalry captain was aware of and interested in the Phylax Society and effectively took over where they left off and in April 1899 formed the ‘Verein für Deutsche Schäferhunde’ acronym SV.
- He was the first President and remained so for 39 years. In effect the day before the SV was formed there were ‘German Sheepdogs’ and the day it was formed those same dogs were called ‘German Shepherd Dogs’. A breed register was established; subject to assessment any German sheepdog could be registered and thereafter called a GSD. Max von Stephanitz favoured specific regions that they came from. This was gradually tightened and the sheepdogs from Thuringia and Württemberg were favoured.
- Württemberg dogs were large, heavy boned and good moving dogs with good tail carriage but semi erect ears. Thuringian dogs were smaller and courser with ring tails but given the wolf look was desired they had the desired characteristic of erect ears and wolf grey colour.
- Max von Stephanitz sought a dog to be the foundation stud dog and breed model going forward. At a show he saw a dog called Hektor Linksrhein, Hektor was bred by a Herr Sparwasser a very successful breeder of German Sheepdogs who bred under the ‘Sparwasser’ affix. Whilst it’s of little importance, logic tells me that Hektor’s original name may have been Hektor vom Sparwasser, Hektor’s litter brother carried this affix. Regardless, von Stephanitz renamed him Horand vom Grafrath. von Stephanitz’s kennel was ‘vom Grafrath’. Horand was recorded in the breed register as the first registered German Shepherd Dog.

- Hektor was already a popular stud dog when von Stephanitz bought him and had been previously owned by a number of people. He was 63 cm high and this probably determined the mid-size measurement. Under von Stephanitz he was heavily inbred on including to his daughters to fix his type, his maternal grandfather was white and all dark eyed whites are his descendant's. Hektor had 53 litters for 140 progeny – this was less than 3 per litter and the norm at the time due to distemper.
- By the early turn of the century dogs of unknown breeding and whites were banned by the SV. There are many published articles that say whites were not banned by von Stephanitz, that he accepted them, that they were banned when the Nazi party forced von Stephanitz to relinquish his position as President and they took control of the SV but this is not true.
- The first SV Sieger Show was held in 1899 – 1901 Sieger was Hektor v Schwaben who was rumoured to be of direct wolf descent. 1937 – 1955 there was no Sieger title only a group of VA dogs designed to take emphasis away from one dog and broaden the blood pool. This was repeated in later years during the Presidency of Dr Rummel but enthusiasts wanted a Sieger, they wanted an outright winner.
- In 1922 Breed Survey was established.
- Naturally over 100 + years the breed has changed. In 'very broad terms' the main changes in type came with Rolf Osnabruckerland - 1950, Quanto and Canto v d Wienerau and to a lesser degree Mutz v d Pelztierfarm – 1970/1971, Uran v Wildsteigerland - 1984 and Zamp v Thermodos – 2006. Incidentally many people, including judges, misuse the word 'type' or more precisely the word 'correct type'. A dog of 'correct type' is a dog that closely resembles the written standard and this term should not be used as it often is to describe dogs where their most prominent features are black and rich red colour, deep hind angulation and an excessively sloping topline!
- Size increased in 1985 primarily as a result of the influence of Palme Wildsteigerland who was Uran's mother. Zamp is a descendant of Palme through Jeck Noricum who was line bred on Palme 3.3
- Net result today compared to say 20 years ago– larger dogs with the breed average moving toward 65cm for males and 60cm for females, higher percentage of elongated dogs 8.5: 10, predominance of rich red and gold colour with black masks and less greys, a much higher proportion of dogs with deep to excessively deep hind angulation and subsequent excessively sloping topline, predominance of a slight to excessive curve to the back and consequent less high withers, higher percentage of foreleg length at 50/50, higher percentage of dogs with a better length and lay of the upper arm, longer croups, longer to excessively longer tails, more dogs with weak pasterns and soft ears, more dogs with unstable hocks in stance and movement, stronger more substantial bitches.

## The Breed's Purpose

The breed was created to be a superior sheep herding, sheep tending, working dog inclined to high achievements and by that definition its critical requirements in order of priority for me are:

- A general appearance that complies with the standard – looks like a GSD.
- Fertility, ability to reproduce, 2 testicles in males – no fertility, no breed exists.
- Good health.
- Sound hips and elbows.
- Firm nerves, self-assured, intelligent, good natured, outgoing, attentive, good watchfulness, willing to please, good protective instincts, good combative instincts, good drive instincts, strong constitution, not overly friendly but not overly aloof and definitely not aggressive or nervous.
- A full and sound mouth, as in teeth – see comments later.
- Good colour – no whites including dark eyed whites. Now a separate breed – White Swiss Shepherd Dog.
- Size within standard range plus or minus 1 cm.
- Effective undercoat.
- The demonstrated ability to be a fit, strong and effective trotting and endurance dog.
- Some people may put these things in a different order and if they do my only comment is that they should consider the contents of the written standard for stock coats and long stock coats in so far as its determination of disqualifying faults, for example placing correct size ahead of effective trotting ability.

## General Appearance

- The change in the general appearance of the GSD since its inception is discussed and demonstrated in drawings and great detail in my 2011 paper '*A Discussion Paper on the Structure of the German Shepherd Dog*'. See web site; [gsdcouncilaustralia.org](http://gsdcouncilaustralia.org). The most significant changes took place around mid to late 1980 and this relates to oversize, the curvature of the backline with consequent levelling of the withers and then in 2000 with the excessive hind angulation, specifically an overlong tibia, consequential decidedly sloping topline and loose hocks and this also coincided with overlong tails.
- The standard calls for a medium size, slightly elongated, powerful and well-muscled dog with dry bone and firm overall structure.
- Slightly elongated; 10% to 17% longer than high used to be 8.5 or 9 to 10. It's the same although for some odd reason 17% seems longer than 8.5 to 10!

- Medium size – 55cm to 60cm and 60cm to 65cm ‘plus or minus 1cm’. Over 1cm is an ‘eliminating fault’, in other words a dog of 66 + cm as per the standard should not be given an excellent grading or Class I.

## Coat

- In layman’s terms there are 2 types of coat – normal coat and long coat. In breed specific terms normal coat is called ‘Stock Coat’ and long hair is called ‘Long Stock Coat’.
- Normal coat is dense, straight, harsh and has close lying hair whereas long coats have long, soft, not close fitting hair with feathering on the ears and legs with bushy breeches and a bushy tail.
- The variability in the hair length in long coats is considerable and it will be interesting to see a long coated dog penalized because its long coat [not lack of undercoat] does not comply with the written standards specific requirements for long coat, e.g. too profuse.
- Von Stephanitz considered long coat to be an impediment to an optimum performance sheep herding, sheep tending dog and as such he considered them to be less desirable for breeding. He said th
- Many people are unaware that long coats could be surveyed and shown in Germany until the late 60’s. They could only get a class II or ‘good’ grading at a show but after this ‘date’ they were banned from breeding. I communicated with Herr Lux regarding this to get a more accurate banned date but there appears to be no clear record of it.
- In 2010 the SV allowed dogs with ‘long coat with undercoat’ to be breed surveyed and shown as a parallel to normal coats but in breeding terms kept at arm’s length.
- Why did the SV bring long coats back? It’s hard to get a clear answer and as such one could speculate on a range of things including the increase in their popularity, broader utilitarianism and pressure from working dog enthusiasts but I imagine its greatest appeal related to increasing club membership.
- My thoughts on long coats - I would rather they were left as was or incorporated into the breed with the highest grading of ‘very good’ and ‘Class II’. Why? Long coat as von Stephanitz said is not conducive to a dog working sheep in an open paddock in what is often adverse wet weather and as such he decreed there should be a penalty imposed for dogs possessing long hair. Fine for many other activities but everything that relates to assessment of a breed of dog has to anchor itself to its original reason for being otherwise the breed will lose its way and as has happened to many breeds they morph into something else, usually a ‘show dog’. The example established by other Sheepdog breeds such as the Border Collie has in my opinion got more logical and practical merit and I recommend that GSD enthusiasts read up on the history of the Border Collie in order to appreciate my comment – it’s parallels to the GSD are quite extraordinary.
- Notwithstanding what I have said and just for the record, do I like long coats? In my mind you are asking me do I like German Shepherd Dogs and of course the answer is, yes I do like them.

## Colour

- The 'in colour' thanks to Walter Martin is rich black and gold red with a black mask. In effect and to his credit and marketing genius, in conjunction with a couple of other features Walter created a 'Wienerau brand' that remains in prominent place to this very day.
- Colours nominated in the standard are black and reddish brown, brown and yellow to light grey markings, black, and grey with darker shadings. White, dark eye or not is a disqualifying fault.
- Max von Stephanitz favoured wolf sable; he did not like the colour all black and gave no support for the inclusion of whites. This last comment is interesting because as I said earlier, white was a popular colour for German Sheepdogs pre SV and many enthusiasts argue that von Stephanitz got it wrong in the way he viewed and dealt with dark eyed whites. Regardless, his opinion led to them being banned from breeding and not surprisingly given white dogs always had a following this led to the establishment of an FCI recognised 'Swiss White'.
- I am often asked about white spots on the chest. The standard states; 'whitish markings on the chest indicate paling pigment' and as such dogs with white chest markings should be penalized to some relative degree if no more than being noted as having indications of paling pigment. What I would say here is that my understanding of genetics states that this white spotting, not always but often associated with white feet markings has no genetic connection to pure whites, to albinism, it is a specific colour allele but the standard is the standard and the rules are the rules.
- For me the signs of paling pigmentation are; lack of mask, pale nails and a red tip to the end of the tail as opposed to a black tip. Judges and Breed Surveyors should take note of this last point.

## Weight

- Dogs 30kg to 40 kg
- Bitches 22kg to 32 kg

## Size

- Dogs 60cm to 65cm + or – 1cm
- Bitches 55cm to 60cm + or – 1cm.
- Unfortunately for the breed and the integrity of many judges and breed surveyors, too often the approach to measuring tends to be one where if the dog is an average to poor specimen it's penalized for being oversize along with much public chest beating by the judge but if it's a lovely dog the measurement is falsely stated as being within size to allow the dog to attain a high place and grading.

My opinion, respect the very basic principle that people of good character, who value their integrity, do not lie. If you lie about a dog's height simply because it is an otherwise beautiful dog you are pandering to your ego, very often succumbing to peer pressure and thereby showing a lack of self-confidence and above all things placing these things above the best

interests of the breed. We have all heard the justification for oversized dogs especially from the owners but my advice is to record the dog's correct size and then deal with it in an appropriate manner. People looking for a stud dog, especially a novice can then make breeding decisions based on fact not fiction.

- Example: At a large show I judged recently I measured an open dog at 67.5cm. I was aware that he was a Class I dog with a survey height from Germany of 65cm and I was aware that he had won BIS at some major shows under German judges, I was aware that the measurement of 65cm had been checked and confirmed as being factual by a Breed Surveyor at a Breed Survey here in Australia. That Breed Surveyor was actually sitting beside me in the tent at the show. The dog was a beautiful dog and as I said, he had done a lot of winning and in the very strong class of Open dogs he led the class and arguably he could have won the class but he was dropped 3 places because of his size. The dog is no less valued by me, indeed I hold him in high regard 'providing his true size is taken into account in the selection of breeding partners'. By judging as I did enthusiasts at the show could then consider their own evaluation based on fact not a lie.
- Did this decision have a positive impact? For a few idealistic people yes, but for the majority, no not really! I say not really because it was overshadowed by politics, personalities, egos and a lack of idealism. Why? Because under the façade and rhetoric, the vast majority of people involved in the sport do not place oversize in its correct context; that is they do not place it in the context of the impediment that this has to a trotting endurance dog. Just as is the case with overangulation they see the German Shepherd Dog as a show dog not a working dog and therefore it is of little relevance regardless of what the standard states and what impact this has on the dog in its inherent working environment.
- The GSDCA has statistical information on all surveyed animals in relation to their height, any male recorded in Australia at 65cm or bitch recorded at 60cm I take with a grain of salt! I shouldn't have to but I do.
- Not all, but most, overlarge dogs tend toward being a bit coarse and tend to have loose jowls and lips that are not tight. The primary problem though is that the additional mass and weight is not conducive to a trotting endurance dog. An exaggerated example, but picture in your mind's eye a Great Dane effortlessly gliding over the ground demonstrating a far reaching gravity defying gait and doing it for 3 to 4 hours!

## Head

- Stating the obvious but a dog must look like a dog and a bitch must look like a bitch.
- The head must be in proportion to the dog, the bigger the dog the bigger the head should be.
- The head should be wedge shaped looking down on it.
- Proportions are 50/50/50 – skull width/skull length/muzzle length.
- Dry – as in not lippy/jowly – as stated earlier this can be a problem with very large dogs.
- Lower jaw should be strong.

- Top of the skull should be 'slightly arched' when viewed from the side as well as the front. Slightly is the word here – no hint of a dome.
- No furrow ideally, a little bit is OK. Close set ears create a furrow, like someone frowning.
- Planes of the top of the skull and muzzle should be parallel when viewed from the side. If this is not the case this creates a dish faced appearance. I have noticed more and more dogs in Germany that have this and then surprisingly I noted that this has been removed from the latest standard?!
- The stop must be clearly evident, gradually sloping but not sharply defined.
- Top of the nose should be straight; a Roman nose is not desirable.
- Lips dark and taut.
- Nose black.
- There are a lot of dogs where the head is too refined but at the same time there is a growing tendency to heads that are too large, are coarse and not dry as the standard requires them to be and this lack of dryness is seen in their loose jowly lips, more evident in the lower lips because the lower lips are easier to see.

## Teeth

- 42 teeth - upper 20 lower 22.
- Teeth must be healthy and strong and dare I say clean, as in white. Scissor bite - 2mm + gap over or under is an 'eliminating fault, this means no grading. Whilst often disregarded or simply not known, the scissor bite and this rule of thumb applies to the side of the mouth not just the incisors.
- Large spaces between the teeth are a fault. Sometimes I have seen a gap where a double P1 has been removed!
- A straight dental ridge of the incisors is a fault.
- Missing teeth are a fault – 1 PM + one other tooth / 1 canine / 1 PM or Molar 2 or 3 teeth.
- Double P1 is not desirable, it is not a fault here but it is in Germany where they don't seem to have them!
- Level bite is an eliminating fault – no grading.
- It is very rare to get missing canines or incisors.
- I often see the lower incisors 1+ 1 have 'dropped' in dogs with a narrow head. This is caused by the incisors being 'squeezed' together and forced forward and downward.



- Penalization for missing teeth is very severe, in my opinion it is too severe when you apply its impediment to the dog in its working environment and when you compare it to other disqualifying faults and how they are dealt with such as oversize.
- It is not mentioned in the standard but under developed teeth should be. I have seen situations where I believe a dog had a double P1 and the P2 has been mistakenly pulled out leaving two P1's or visually an underdeveloped P2 followed by a gap!

## Eyes

- Medium size.
- Almond shaped.
- Slightly slanting.
- Not protruding.
- As dark as possible – reference to matching the surrounding coat no longer applies.
- Light eyes are not desirable – as with round eyes they spoil the expression, light eyes are noted in the standard as being an indicator of paling pigment!

## Ears

- Medium size.
- Carried erect.
- Pointed.
- Facing forward.
- Semi erect ears, low set ears, inward tipped ears and infirm ears are a 'serious fault' such dogs are dropped a grading.
- Ears should be in proportion to the size of the dog, a recent growing trend is for ears getting too large, a little thin in their leather and sometimes have a roll backed tip.

## Neck

- Strong.
- Well-muscled.
- Carried at about 45 degrees lower in gaitin.
- Good length.
- Not short.
- Dogs with a short neck tend to lower their head in movement, this relates to the centre of gravity. The 9<sup>th</sup> rib space is the centre of gravity in a dog. When dogs move forward they lower their head to facilitate forward movement and speed. Jockeys sit forward in the saddle to increase speed. A person initiates forward movement and running by pushing/leaning their

head forward for the same reason, it moves the centre of gravity forward and this creates a falling effect and it increases speed.

## Withers

- Let me start this section by saying that I think it would be fair to say that there are very few judges or surveyors in Australia that agree with me in regard to my definition of high withers and flat or low withers. Their definition is the complete reverse of mine! **Now I have your attention!**
- The withers are the section that goes from the base of neck, from the last cervical vertebrae, to the start of the back, this incorporates about the first 3 or 4 of the 13 thoracic vertebrae. In stance the withers should be high, long and slightly sloping into a straight back and note that I have said slightly sloping into a straight back not into a level back. If the back is curved the wither definition will, relative to the extent of the curve, disappear as they are no longer high. This will be explained when we get to the back.
- In the trotting dog the outline of the high, long, sloping withers are primarily formed by the uppermost top edge of the scapula not by the thoracic vertebrae or more precisely the tops of the dorsal spines of the thoracic vertebrae. When the definition of the withers disappears, creating level or low withers, it is inevitably because the top of the dorsal spines of the thoracic vertebrae have risen along with the attached lumbar vertebrae.
- When you feel in between the top of the shoulder blades what you are feeling is the top of the dorsal spines of the thoracic vertebrae and specifically the rhomboideus muscle that is attached to the top of them.
- If you feel this area and the muscle that you are touching is above the top of the uppermost leading edge of the scapula you have a dog that will be either somewhat heavy of foot in the fore hand when gaiting and dependant on the relative height of his back to the withers, to varying degrees, falling on the forehand.
- If you feel this place and what you feel is by any amount below the uppermost leading edge of the top of the scapula and the dog does not have a decidedly obvious curve to its back or have an arched loin it will not fall on the forehand because it has high withers.
- In the German Shepherd Dog for the top of the dorsal spines of the thoracic vertebrae to be above the top of the uppermost top edge of the scapula the back has to be curved, this is the only way the dorsal spines of the thoracic vertebrae can attain that height. The dorsal spines of the thoracic vertebrae cannot project or elevate themselves upward without bringing the lumbar vertebrae with them. The thoracic vertebrae are not hinged at the anticlinal vertebrae allowing the dorsal spines of the thoracic vertebrae to rise whilst leaving the lumbar vertebrae where they were; consequently a dog with a curved back as opposed to a very slightly curved back cannot have high, long, sloping withers and consequently will fall on the forehand when gaiting.

## Function of the Withers

- There are three primary muscles in the withers. The withers function is to move and direct the shoulder blades and to provide an attachment for the muscles of the shoulder and neck. The

largest muscle in this area is the serratus ventralis and over the top of the vertebrae and the top of the scapula is the rhomboideus muscle and over this is the trapezius muscle.

- The trapezius muscle attaches from the 3rd cervical vertebrae - C3 to the 9th thoracic vertebrae - T9 along the dorsal spines and laterally to the spine of the scapula. Its action is to elevate the fore limb and draw it forward.
- The rhomboideus muscle is attached to the dorsal spines of the thoracic vertebrae T4 to T7 and across to the top of the shoulder blade edge/rim. This muscle is very tightly bound to the latissimus dorsi muscle. Its action is to elevate the limb, pull the limb and the shoulder forward or backward and to draw the scapula against the rib cage/trunk thereby keeping the top of the shoulder blades stable during the dog's mobility stages.
- The serratus ventralis muscle covers the lower part of the neck and the forward section of the thoracic wall. It is very strong, fan shaped and arises from the medial side of the scapula and attaches to the lateral chest. The function of this muscle is to support the trunk, carry the trunk forward and backward, assist in allowing the shoulder blades to rotate, to oscillate and to rise and fall during movement and to carry the shoulder forward and backward with respect to the limbs.
- As the dorsal spines thoracic vertebrae get lower in relation to the top of the scapula the top of the shoulder blades get higher in relation to the top of the dorsal spines and consequently they get closer together at their leading edge, the muscle spans a lesser distance and via this attachment gives firmer withers in movement.
- The serratus ventralis is a huge fan shaped muscle connected to 9 ribs and extends to the lower neck and is attached to the whole of the internal face of the scapula.
- The serratus ventralis is referred to by clinicians as the anti-gravity muscle and as a sling muscle and this is important in understanding the withers function and in part understanding why dogs fall on the forehand. This muscle is what stops gravity pushing the trunk, neck and head of the dog toward the ground when it runs.
- The serratus ventralis muscle literally carries the dog's thorax, its trunk, whilst the dog is standing and gaiting. If you cut this muscle the whole dog's trunk/spine/neck/head would fall to the ground. All that would be left standing would be a pair of the forelegs, upper arms and shoulder blades. If you don't understand this you will not understand how the withers function.
- Energy being generated from the muscles in the hindquarters is transmitted forward into a specific area within the serratus ventralis muscle; this is referred to as the forward pivot point. There are two pivot points. The rear pivot point, which is the sacroiliac joint and the forward pivot point which is where the serratus ventralis muscle is anchored to the top of the scapula.
- From this pivot point energy is transferred through the serratus muscle assisting shoulder blade rotation and on down into the forehand and forelimbs creating forward motion.
- These two muscles keep the shoulder blades attached but apart and whilst allowing necessary rotation and flex keep them steady during movement. As an aside, if the shoulder blades were

not kept apart the dog would not be able to put its nose to the ground nor eat or drink. My observation is that a 25mm gap is ideal. A too wide a gap is called 'loaded shoulders'.

- If the dorsal spines of the thoracic vertebrae is above the top of the scapula edge the space between the shoulder blades is excessively widened and consequently the firm attachment is diminished and subject to the relative firmness of the rhomboideus muscle and impacted by the relative height of the back the shoulder blades will slide excessively up and down against the rib cage and the down slide impacted by the weight of gravity will manifest itself in the dog being heavy in its fore steps or falling on the forehand.
- When I talk about the dogs withers, inevitably someone asks about the horse's withers and as it is with most questions people put to me, a short answer is wanted but there is no short answer. This question generally comes about because the terminology that is applied to the various parts of the dog is in most regards taken from horse terminology and in that process many people assume the functions must be the same however in a number of areas they are not the same.
- The top of the thoracic spines in the horse are 'much longer' and 'much higher' than the tops of the shoulder blades in the dog. In the horse rigidity in the forehand and a high position of the thoracic spines to create a ridge to secure the saddle is paramount. In the horse these two factors have a direct relationship to the muscles that connect the horse's thoracic vertebrae at the withers. To give this high position the dorsal spines of the thoracic vertebrae in the horse extend 'well above' the top of the scapula 'but' to accommodate this, the horse's scapula is made longer, extended higher and this is achieved by means of cartilage that is fused to the top of the scapula. This means the scapula of the dog can't be compared to the horse without explanation and understanding, there is similarity but in some ways it's also like comparing apples to oranges. What I am saying is that the 'extension' of the horses scapula via this cartilage accommodates the increased elevation in the thoracic vertebrae spines and in doing so it effectively gives the same relative 'high wither' position/effect as in the dog.

We will now move to the back and how the back impacts directly on wither height.

## Back

The back is the section that goes from the withers to the start of the croup; 8 of the 13 thoracic and 7 lumbar. The back itself should be moderately long which should derive from good length in the rib cage but a relatively short loin. It must be firm, straight, strong and well-muscled. In direct terms slope is not a word that is used to directly describe the back in the latest SV standard of 23/12/2010 but it is clearly inferred and historically understood – it states; *'the topline runs from the base of the neck via the high long withers and via the straight back towards the slightly sloping croup without visible interruption'*. This implies that the back is to be a continuous straight line basically following the same sloping line as the withers. The change in the definition of the withers and the back was made with the SV amendment to the SV standard of 30/8/76. In this earlier standard it stated *'the withers must be long and high enough well indicated against the back into which it must gently flow without disrupting the backline slightly sloping from the front to the rear'*. To that date the withers had to be well defined against the back, not joining into the back at an angle as occurs with a weak back but gently and smoothly flowing into the back which itself should slightly slope from front to rear. The more recent amendments have diluted the requirement for the back to be 'well defined against the withers'. For those struggling to come to grips with the current standard and the breeds developmental topline trend this is important to understand and like it or not, accept!

- Let me make it very clear to everyone here that is concerned or confused about the back, the only correct back is one that is straight. Having said that, the latissimus dorsi muscle, tendons and ligaments that are laid over the vertebrae of the back can and should create a 'very slight' curve and the emphasis is on 'slight'. When the back is absolutely straight in relation to the spine and this muscle is well developed the back is in effect not dead straight outwardly but at the same time nor is it curved. The spine is straight but outwardly it is not or at least it shouldn't be. It's all a matter of understanding and that's what this lecture is all about, educating people who love the breed and educating people that are outside the breed and wish to learn and understand it.
- Max von Stephanitz stated that the back should be straight and he did also say it should be level and the preference by some people for a level back comes from this statement and period in time. Under or moderate hind angulation will give a level back, this is because the patella is at a higher point from the ground thereby raising the height of the croup. The word level was removed from the standard a long time ago and replaced with 'slightly sloping'; it coincided with the improved hind angulation. Where the spines of the vertebrae change direction you can sometimes see a nick at that point. This is not a weakness in the back it is underdeveloped muscle and it has little impact on the dog's movement.
- The back should be defined against the withers. As I covered earlier, this description has been amended in the standard over the years. This is repetitive but it needs reinforcement. The latest standard dilutes the requirement for the withers to be well defined against the back, it implies that 'visually' the back is almost an extension of the withers, seen as a continuous line flowing into or if you like flowing from them and the effect of this can be seen readily in many of today's dogs where it is much harder to see where the withers finish and the back starts and no more so than in dogs with a curve to the back. This very subtle amendment to the standard is very significant to the debate and varying opinions regarding the back/topline; how it once was and how it is now. Visually this relatively very small amendment to the standard had a profound developmental impact on the German Shepherd Dogs topline.
- The only issue that I wish to discuss here is a curvature and a peak to the back. I have already stated that anything other than straight is incorrect and I have defined 'straight'. It's what causes the curve and peak and the acceptable degree of that curve or peak that is important to discuss and understand.
- The curve or peak is created by the thoracic and lumbar vertebrae and their attached spines curving upward. It is not the attached spines increasing in length, it's an upward curve of the whole spine and contrary to what some people have suggested, it is not has no relationship whatsoever to the short underchest or if you like, the apparent upward curve of the underline. A 'very slight curve' has little impact on movement. It is when the curve creates a position where the highest point of the back is higher than the highest point of the withers that the withers turn from being a functional asset to an impediment to movement and the effects of this are relatively complex and difficult to fully understand.
- With a 'defined curve' the croup angle becomes steeper and this affects the drive giving more but unnecessary upward thrust and less forward thrust. Unless it is an extreme curve this tends to not be a significant impediment to movement especially when you consider at most shows when it comes to the gaiting for a dog it's a walk in the park. Maybe not for the handler and there are reasons for this that are primarily related to the dogs extraordinary ability to

recycle energy but that's for another day. When the tops of the dorsal spines of the thoracic vertebrae rise to the same level or above the top of the scapula's uppermost edge the tops of the spines run into the withers at too high a point. The back has to be straight and the top of the spines should ideally enter into the scapula just below the scapula's top edge – this gives the best rhomboideus attachment and creates high defined withers. In weak backed dogs they generally have high long very pronounced withers because the spines are coming into the withers at a low elevation. Curved backed dogs have flat/low indefinable withers and putting aside the standard states the back should be straight and for good reason, that is the main reason why a curved back is undesirable, it's negative impact on the withers.

- The peak in the back? Not as bad as a defined curve because the top of the spines of the thoracic vertebrae run downward from the peak and enter the shoulder/wither region at a lower level and therefore get a better attachment. To help demonstrate the whole issue, if you had two dogs of equal merit and one had a curve where the highest point of the back was higher than the withers and the other had a peak that was exactly the same height measured off the ground the peaked backed dog would fall less on the forehand because the thoracic vertebrae would be running downward into and hopefully below the top edge of the scapula.
- Final point – the full length of the spine needs to be straight when looking down at it from above otherwise this creates crabbing.

## Croup

- The croup formed by the pelvis should be long and slightly sloping at about 23 degrees outwardly or 27 degrees through its central line. The back should merge into the croup and the tail without interruption. The function of the croup is to bear the weight of the hindquarter and direct energy and force from the hindquarter to the forehand. It is subjected to 2.7 times the dog's body weight during movement.
- The pelvis is made up of three parts, the Ilium, Ischium and Pubis.
- These are separate parts at birth and fuse together finally closing at about 12 months of age.
- As the dog grows the angle of the croup doesn't change but the length does. The exception to this is in regard to the angle of the croup, if the back is slightly curved and settles with age the angle will change all be it slightly.
- The pelvis is fused to the spine via the sacroiliac joint and this reduces markedly the pelvis' movement when the dog is mobile. The force from the rear to the forehand comes through the sacroiliac joint.
- The angle of the croup determines the direction of forward and upward force.
- A 23 degree croup has 'balanced' forward and lift displacement – this accommodates the hindquarter being lighter than the forequarter to a ratio of approximately 40:60.
- A steep croup gives too much upward direction of force and the reduced forward direction of energy reduces forward drive. A steep croup is good for jumping, galloping and uphill running.

- A flat croup gives too much forward thrust and not enough lift to the rear. Too much forward drive 'eventually' fatigues the forehand so it is not ideal for an endurance dog.
- The longer the croup the broader the thighs muscle mass and assuming the muscles are well developed, the greater the thrust. A short croup gives a narrow thigh and a long croup gives a wide thigh. The best way to assess the croup's length is from the front of the pelvis to the root of the tail however this can be difficult for many people and as such it is best determined via the front edge of the muscle that is attached to the front of the pelvis and the top of the femur, the sartorius muscle.

## Tail

- The standard requires the tail to reach at least to the hock 'but not beyond the middle of the hock' and hang in a gentle curve. Sorry, what did you just say about it should not extend past the middle of the hock? Need to change that in the next amendment! The tail should not be raised above the horizontal during movement. The standard states that sideways casts are not desirable nor are hooks in the tail. Operations on the tail are forbidden but they happen – don't they?!
- High set tails are not desirable but it is an aesthetic issue only and can disguise a steep croup in the eyes of a novice.
- The tail is a measure of the dog's soul, he communicates with it and perhaps it is useful for balancing in movement but this is a point of conjecture and debate. There are some studies that suggest puppies with long tails stand before those with short tails!
- Tail length is something that has never been brought to account and tails are now totally out of control, that is, they are getting too long but I have yet to read a judges critique making such a comment on a dog. It is stated in the standard that the tail should not extend past the middle of the hock but it is not listed as a fault so there is no penalty for a tail that runs along the ground. In Germany it is a significant, yet seemingly un concerning, problem and I say this because it is never noted by judges even when the tail is excessively long.

## Forehand

- Scapula/shoulder blades contribute to forward propulsion, assist the front legs to lift and swing and help absorb shock. They should be set at approximately 45 degrees to the horizontal; there is argument for 50 degrees which I support. The ridge that runs longitudinally through the scapula gives it reinforcement. The scapula is only attached to the trunk by muscles and tendons and it oscillates back and forth as it directs energy to the upperarm and on to the forelegs. A steep scapula and a forward placed scapula create a high neck carriage.
- The upperarm effectively transfers the energy to the foreleg in its back and forth pendulum swing phases and is pulled forward by a long muscle attached to the base of the skull and rearward by 2 muscles attached to the rib cage. It does not extend past the vertical in its forward swing phase. Ideally it should be set at 50 degrees off horizontal and be 10% longer than the scapula.

- The forearm or foreleg consists of two bones the radius and the ulna. The most significant thing that impacts on fore reach in 'dogs as a whole', on indeed all animals is the length of the foreleg – the longer the foreleg the greater the swing arc but as the forelegs are about the same in all German Shepherd Dogs the upperarm is the primary determinate.
- The shorter and steeper the upperarm the shorter the fore reach.
- The foreleg should be 50 to 55 percent of the dogs height – 55 is better for fore reach. Its length should be about the same length as the upperarm when measured from inside the elbow to the point of connection to the wrist [carpus]. This does not include the pastern and this is called the radius.
- The maximum length of foreleg extension can be seen as a straight line down the middle of the scapula directly along the midline of the humerus.
- Elbows connect the upper arm to the lower arm and they have three separate joints and these allow the elbows to hinge and swivel but they do not allow sideways movement. This latter fact can lead to trauma of the elbow joint, specifically the coronoid process. Elbows should not be turned out nor turned in. The elbows rotate with the dog's body around the radius allowing outward and inward rotation and this rotation is greatest in trotting dogs. If you hold your palm up and then turn your hand down, that is called pronation and vice versa. When dogs gait pronation and supination occurs, this is normal, the ulna/elbow allows this to happen. This is seen as the foreleg extends out to its maximum point you can see the underside of the pad of the dogs foot .Some animals like horses can't do this. Dogs with elbow dysplasia sometimes stand with a one foot turned out. Dogs with a narrow chest stand with elbows close together and feet turned out. Insufficient depth of chest, that is when the sternum is above the elbows causes the elbows to be pulled in and under and consequently for the feet to be turned out. Barrel chested dogs stand and move with elbows too far apart.
- Pasterns are a collection of seven bones and the pasterns should be 1/3 the length of the forearm and set at 20 to 22 degrees and effectively act as shock absorbers when the dog is walking, trotting etc. and have a significant flexion and extension range. Through their ligaments during gaiting as the stretch they store energy and via this contribute to the forward drive. The very flexible tarsus/wrist contributes slightly to supination and abduction.
- Feet should be rounded and tight, nails black. Front feet are larger than the rear feet because as covered earlier there is more weight in the forehand than the rear. They should be pointing straight ahead when viewed from the front not turned out nor turned in.
- A narrow chested dog stands with feet turned out, a barrel chested dogs' feet often turn in.
- Viewed from the side there is a vertical column that is important for forehand balance, this vertical column is the line of gravity. The coinciding/intercepting reference points necessary for the forehand to be balanced are the centre of the scapula at its upper point and the rear part of the connecting joint of the upper arm and foreleg. This configuration allows that vertical gravity line to continue down through the ulna and on to the ground. These coinciding reference points only happen when the forehand is correctly structured.
- Viewed from the front this vertical column runs through the centre of the column of bone created by the scapula, the upperarm, the foreleg, pastern and foot. A narrow chest which



pulls the elbows in or a barrel chest that pushes the elbows out disrupts this balance in movement as the dog tries to position the feet under the line of gravity.

## Forechest

- This is created by the prosternum and should be about 50mm forward of the point of the shoulder. Overdeveloped forechests, i.e. a prosternum projecting too far forward, will give the illusion that a dog with a steep upperarm has a very good angle of the upperarm.

## Underchest

- The sternum forms the base of the underchest and anchors the rib cage and gives support to the elbows. Its primary function is to provide protection to the heart and lungs. A short underchest which is a significant problem here in Australia is created by the ribs not going back far enough and this reduces vital organ space. This tuck up is beneficial to galloping dogs as it gives greater room for back flexing but is not ideal for a trotting endurance dog.

## Hindquarters

- The hindquarters specifically their muscles provide the bulk of the drive that gives forward propulsion. For reasons of balance and equitable transfer of energy the upper thigh – femur and lower thigh – tibia are about the same length and are very roughly speaking the same length as the shoulder blade and upperarm. For the micro enthusiast who loves detail - the femur is approx. 20% longer than the shoulder blade and the tibia is approx. 20% longer than the upperarm and the upperarm is approx. 10% longer than the shoulder blade. When the dog is standing with the hock plumb the femur and tibia should form an angle of about 120 / 130 degrees or put another way off the horizontal the femur lays at approx. 105 degrees and the tibia at approx. 30 degrees. This is measured through their axis points.
- I have always been concerned about overangulation of the hindquarter and to a degree I have been the butt of well-meaning jokes in this regard. The problem has got worse and is now a chronic but almost accepted problem in Europe. In this context the ideal hindquarter angulation for a trotting endurance dog is exactly as von Stephanitz determined it 100 + years ago. In his time the dogs were under-angulated and he worked to increase the length of the femur and tibia to maximize the drive, he almost got there prior to his death. The goal was achieved in the early 70's starting with Marko v Cellerland who ironically was promoted as a working dog line. This ideal moderate and balanced hind angulation was consolidated only to be lost to the trend of overangulation in the early 90's and it has got progressively worse ever since. Along with the resultant unstable wobbly hocks and excessively sloping topline it is now 'almost' accepted as normal and I read critiques of dogs that to me are grossly overangulated and it states 'very good hind angulation' but often stating as though there is no co-relation' hocks should be firmer'. Von Stephanitz would be greatly saddened by this as I am sure people involved in working dogs must be.

## Hip Joint

- The hip joint requires little explanation other than to say it connects the femur to the pelvis. What is relevant is being aware that in a moderate trotting phase the load on the hip joint is six times the dog's bodyweight and that is an enormous load.

## **Femur**

- Supports the patella/knee/stifle and in its connection to the pelvis provides stability to the hindquarter.
- The femur is a much stronger bone than the tibia, it is the second strongest bone in the dog's body, the upperarm is the strongest. In humans it can carry 30 times a person's weight.
- The very substantial muscles of the hindquarter quite often referred to as the hamstring muscles are anchored at the pelvis and create the vast bulk of the drive. They are attached to the femur. Some of these muscles create push through the femur down through the patella and on down through the tibia.

## **Knee/stifle joint**

- The knee connects the femur to the tibia via the patella. It acts as a shock absorber to the hindquarters, it limits the rear extension of the femur and indirectly the tibia and in its functioning process it glides, flexes and rotates. Just as a matter of interest in some animals such as the horse a locking mechanism in the joint allows them to sleep whilst standing. In dogs that are overangulated, in stance and to proportionate degrees the patella comes closer to the ground and whilst this has an effect while the dog is standing, during the gait the patella has difficulty supporting the weight of the hindquarter. The knee on reaching the hip axis point can have difficulty supporting the dog's hindquarter weight, actually causing the dog's hindquarter to drop closer to the ground than it should.

## **Tibia**

- Primary function of the tibia is to extend the hock, flex the knee and act as a conduit for the thrust being generated by the muscles attached to the femur.
- It is connected to the femur by a muscle that is attached to the Achilles tendon.
- It is a relatively thin bone and it is not designed to carry a lot of weight.
- It acts as a stabilizer for the hocks – the longer the tibia, the harder it is to stabilize the hocks. The longer the tibia gets the less stable and in movement the more uncontrollable the hocks become.
- In excessively long tibias in stance a dog will stand with the hocks close together and lying on an inward angle [cow hock] sometimes actually touching each other. When a dog is overangulated you don't need to gait that dog away from you to determine if the hocks are stable, you can see it while it's standing.
- As the tibia gets too long the patella/knee moves closer to the ground and this creates the excessive slope to the topline that unfortunately for the breed so many people seem to love and I refer to a slope not just in stance but in movement.

- Seen from the rear, when the tibia is too long, force from the hocks is generated not in a straight line through the tibia, the femur and into the pelvis but as the hocks buckle it is deflected outward then inwards losing valuable energy and it can stress the hip joints. Dogs with too long a tibia, subject to the upper thighs muscle mass and firmness of that muscle mass will have loose unstable hocks. A bad combination is a short croup [narrow muscle mass] and overlong tibia and when paired is becoming the norm in Australia. If you like over-angulation then you best ensure you have a very long croup and work your dog very hard.

## Hocks

- Strong medium length hocks are ideal for the GSD.
- The hocks act as a lever for motion and work on the lever principle of; energy applied through a fulcrum move a load. The energy applied is at the tip of the calcaneus, the fulcrum is at the base of the calcaneus and the load is at the toes.
- The best way to understand the effect of the hocks is to apply it to your feet. The base of the foot creates leverage. The longer your foot the greater the leverage and the faster you will be propelled forward but at the cost of energy. In a way you could say it factors up thrust and increases speed in that process.
- The hocks are activated by several muscle/tendon groups the most significant being the Gastrocnemius [calf] muscle and the attached Achilles tendon. In simple terms when the hock is fully extended the Achilles tendon pulls it forward with great force. In over angulated dogs when the tibia is too long the Achilles tendon becomes a little too long to be effective.
- When the dog is running the energy applied to the ground at the pads of the feet for an adult male GSD is 170kgs.
- The shorter the hocks the less force required to move the same load but this generates less thrust and less speed. Long hocks = greater travel distance and speed but more energy is required. A balance is ideal – not too long and not too short.
- Short distance sprinters like Greyhounds have long hocks but it's at the cost of high energy consumption – great for short distance sprinters but not for long distance endurance.

## Bones

- There is little reference to bones in the standard other than saying the bones should be dry, an odd word meaning not spongy, oval not round and when you run your hand over the bone it is smooth not lumpy. This lack of reference to the bones is interesting given the importance of the bones to the dog especially in regard to the relationship the length of the bones have to muscles and tendons. Long bones mean longer tendons and longer and broader muscle mass.

An observation I have made of late is the number of dogs that are getting larger and their bones are getting finer. When a dog has this characteristic everything will be refined and this is most evident in the head. Males will look feminine – often I read critiques on bitches where their head is too fine and because there is no relative word from 'masculine looks feminine' the critique says 'very feminine'.

- Ideally, as a medium sized working dog the GSD should have sufficient strength and mass to do its designed job. Dogs that are too heavy, too large, too small or too light and the dog loses its ability and flexibility to function to its maximum capacity.

## **Movement – the big one kept for last**

- In many ways movement encapsulates most of what has been covered here and that is why it is the largest topic, it covers everything in an interconnected way.
- Many of the aspects of movement are complex, for example there are still aspects in regard to the way the muscles work within the wither region that are still not well understood.
- The GSD is a trotter and the fore and hind limbs must be co-ordinated in other words balanced in their length and angle so that the dog can transfer energy from the hindquarters to the forehand without any essential change of the topline the forehand limbs can fully maximise that force. Key elements to the gait are the size of the dog, proportions of the body, good length and angles of the bones that are balanced against each other and in its optimum this will give a gait that is far reaching, giving the impression of being effortless and flat over the ground. I repeat flat over the ground not on an angle to the ground. The head in movement is pushed forward to shift the centre of gravity and with a slightly raised tail the result is a consistent smooth trot showing a gently curved uninterrupted upper line from the ear tips over the neck and back to the end of the tail. WOW!
- How is this wonderful almost poetic and gravity defying movement achieved? To a degree we have covered it but in sections. It's when all those sections are brought together you either get it or you don't and more often than not you don't, at least not to the seamless degree I have just described.
- So how does it all work and how does it come together?
- It starts with the first step – which foot moves forward first? The answer to this question is the same as applying it to yourself – it's whichever foot you decide will move first. Right handedness vs. left probably plays a part in this but your brain sends an electrical impulse to a particular muscle or muscle group and that in turn causes a particular bone to extend or contract.
- There are two types of muscles and they are referred to as antagonist muscles because they react off each other. If back and forth motion is required a minimum of two muscles are needed. One pulls a bone in one direction and the other pulls the bone in the other direction. The muscle that closes a joint is known as an abductor and the one that extends a limb is known as an extensor.
- When a person wants to move forward they do this by leaning their upper body forward and the effect of gravity takes it from there. This is because the centre of gravity in a human is very high in the body. A dog can't do this because the dog is on all four limbs and as an aside the centre of gravity is too far back – the centre of gravity in a dog is located in the space between the 9<sup>th</sup> and 10<sup>th</sup> rib.

- So how does a dog propel itself forward? It is quite complex.
- The dog sends a signal from its brain to a specific muscle and this causes that muscle to contract and via its tendons to pull on a specific bone/s and utilizing a specific joint/s the selected foot is moved forward or backward. There is a synchronizing that takes place in the brain that ensures the co-ordination of the rear and fore feet in whatever foot fall sequence is selected by the dog.
- The muscles that push the rear forward by extending the rear limbs and that are attached to the femur and to a lesser degree to the tibia are primarily the hamstring muscles; these are huge, are located in the upper thigh region, anchored to the pelvis and are attached via ligaments to the femur. It is important to know that forward motion can only happen when the foot is directly under and behind the hip joint.
- When the rear foot is in its swing stage, that is the adductor muscle has pulled it forward to the midline of the body, has landed on the ground and is now moving in the rearward direction, as soon as the foot is under the hip axis point the forward thrust commences propelling the dog forward and this thrust ends when that foot reaches its full extension and the opposite foot which has now made contact with the ground midway under the body takes over and continues the cycle.
- The muscles that pull the front leg forward are attached to the scapula and the upperarm and they in turn are attached to the base of the neck and skull. When they get the message to contract, the upperarm and to a much lesser degree the shoulder blade and foreleg are pulled forward. The dog's brain synchronizes the rear and fore muscle/bone/joint/limb contractions.
- For those technically inclined there are three major muscles that contract and in that process push the rear legs backwards; the biceps femoris which is attached to the femur, the gluteal muscles, the semimembranosus and the adductor magnus.
- The greatest amount of thrust, that is pounds of pressure delivered to the ground by the rear paw is achieved approximately two thirds the way through the rear swing cycle, it is about the point when the hock is just past the vertical. This tells us that excessively overangulated dogs do not attain maximum thrust because their hock moves forward before it opens out or in the case of excessively angulated dogs the foot and hock stops its rear cycle before it even gets to the vertical and in these cases it impacts on foot lift consequently the dog's toes are very close to the ground as the paw sweeps forward. On a hard surface you can sometimes hear the dog's nails scraping and the movement attains a shuffle effect.
- When walking and gaiting all thrust from a rear limb ends at the point when the foot pad attains its maximum rear extension, at the point immediately prior to leaving the ground to commence its forward cycle. At that stage of the cycle the opposite foot takes over to generate the thrust and so it goes on repeating that sequence.
- What is happening with the feet as they sweep forward? Nothing really until they make contact with the ground. It is very important to be aware of the fact that when the fore and rear feet first strike the ground this creates a braking action and until the fore paw on its return sweep is directly under and behind the centre of the shoulder blade and the rear paw is directly under and behind the hip these paws/limbs generate no forward thrust, to the contrary they create a slowdown effect just as it does in a human when they are running.

- The transfer of the thrust from the hindquarter is through the pelvis via the sacroiliac joint which is fused to the spine and as such to all intent and purpose it is inflexible.
- I stated that the brain synchronizes the fore and rear limbs to ensure they work in unison. The only thing that interrupts this synchronizing in so far as optimum gaiting and especially ground cover is when the rear and fore bones and their attached muscles are not in balance, do not complement one another. Whilst muscle development plays a significant part, if the length and angle of the bones in the hindquarter do not balance those in the forequarter, the imbalance will reflect negatively on the movement.
- Harmonious, balanced, effortless, flowing, ground covering and enduring movement as described in the opening preamble only comes about if everything is in balance. If the croup is short and steep causing reduced thrust and reduced ground cover even if the dog has a perfect forehand the dog can only correspond or perhaps a better word is match the rear hand. The fore reach will be shortened even though it may be able to reach twice as far as it does. The reverse applies with having an ideal hindquarter but short upperarm, the dog will react in several ways; it will reduce its hind drive to match the forehands capacity thereby not overloading the forehand or it will deliver the drive unencumbered but lift the forelegs at the elbow as in high hackney stepping to disperse the unwanted thrust. Maximizing energy and ensuring endurance is the best outcome therefore the former action is preferred. There are endless combinations to this but you have got the idea of compensatory drive and reach and the fact that sometimes two faults are better than one!
- Something to be aware of is that whilst the bulk of the generated 'muscle power' comes from the rear, dogs must exert force or if you like they must push on the ground using all four limbs in order to bear the weight of the body and propel itself forward. These forces have been measured using pressure plates. That is, dogs were made to run over plates on the ground that measured the force applied to them by each foot/limb.
- Whilst the outcome once you consider it and its explained to you is logical, the results surprised many people as it showed the force applied to the ground by the front feet was considerable. Most people tend to think all the force that drives a dog forward comes from the rear and is delivered to the ground at the rear; that the forelegs just do the steering so to speak. Not so.
- Dr Curtis Brown in his book 'Dog Locomotion and Gait Analysis' stated from his research in regard to a range of dog breeds '*Most of us have been told that the front paw carries most of the weight and the rear paw furnishes most of the drive. In this trotting test, the front paw furnished just as much forward drive as did the rear paw.*
- He went on to say '*Dogs designed to be trotters at the trot indicate that the rear paw does supply the greater percentage of forward drive by about the ratio of 60 to 40.*

## **To Conclude:**

- What are key and optimum factors to be aware of during movement and in particular during the trot? It's a big list and reflects why understanding movement in the dog is not simple.
- Hind thrust commences only when the rear foot is directly under the hip joint and thrust

continues from that point until that foot comes to the end of its rear swing at which time the opposite foot takes over the cycle. The same applies in the forehand and the axis trigger point there is the shoulder blade.

- During trotting the maximum rear thrust is generated at a point that is two thirds the way through the rear swing cycle and the maximum forward thrust is only achieved if the hock is extended backward to about 60 degrees off the horizontal.
- Whilst the majority of the power comes from the rear quarter muscles, the force that creates forward movement is applied to the ground by all four feet not just the rear feet.
- When the forward reaching foot, front and rear, makes contact with the ground it creates a breaking effect. Until that foot passes the shoulder or hip axis point it creates a slowdown effect.
- At the trot, at the forward reaching mid-point, the pad of the foot and not any part of the back of the hock should make contact with the ground and on the back sweep the hock should not stop and commence its forward step until it attains the earlier quoted angle of about 60 degrees.
- Both the femur and tibia should be long, but not overlong; nor should they be too short and most importantly they must be in balance to themselves and the scapula and upperarm.
- The croup must be long and correctly angled.
- Muscles and ligaments throughout the whole body must be well developed, taught and hard.
- The back must be straight, in stance slightly sloping and in gait level. It must be moderately long, well-muscled, tight, and should not have a curve, peak or deflection.
- The withers must be high, long and flowing into the back and in relation to the back they must not be visually level with it and definitely not below it.
- The neck must not be short; it must have good length but proportionate length.
- The scapula and upperarm must be long, well angled and proportionately balanced to the length and angle of the femur and tibia.
- The depth of the chest should be about 45% to 48% of the withers height. More dogs are moving toward 50%, I definitely prefer 45%. This means the forelegs should be a little longer than the chest depth and when assessing chest depth especially on long stock coats it is important to read this at the dogs elbow and not at its underchest guard hairs.
- The front feet, during gaiting, should not rise above the ground any more than the height of the dog's wrist [talus] as measured when the dog is standing.
- The front paw should only extend forward during the trot to about the dogs eye and definitely no further than its nose.
- The less cross-over of the fore and rear feet at the mid-point the better.

- Whilst there should be a gently curved uninterrupted line from the ear tips over the neck and back to the end of the tail the dog should travel flat over the ground not travel at an angle to it.
- The dog must be fit.
- Finally, all of the above means absolutely nothing if the dog does not have the right attitude, energy, drive, temperament and inherent eager willingness to run and work.

### **Louis Donald**

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