

Conformation



Information compiled by

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Recommended Youtube videos:

Danny Marks Conformation 2008 Practical Horseman (1 hour 30 minutes long - primarily concerned with elite jumpers; well worth the time)

Conformation and Selection of Horses, Michigan State University<https://www.youtube.com/user/MyHorseUniversity> (1:05:56)

Applied Anatomy and Biomechanics <http://www.horsesinsideandout.com> (3:38 commercial for a course they are offering but it has some good footage)

Selecting Horses

Horses have been domesticated for over 5000 years (Dunlop and Williams, 1996)

During that time, two primary means have been used in the selection of horses:

- temperament
- conformation

Conformation

- conformation is the way a horse is built
- it is the horse's outward appearance
- **conformation** (root word: **form**)
- form meaning *shape*
- the study of **conformation** is the study of **biomechanics**
- **biomechanics** is the study of mechanical laws relating to the anatomical structure and function of biological systems, especially the forces exerted by muscles and gravity on the skeletal system
- good conformation is:
 - attractive
 - it is much easier for many people to ride a horse they enjoy looking at
 - functional
 - produces a better balanced horse
 - produces a more athletic horse
 - produces a sounder horse
 - produces a stronger horse
 - produces a better moving horse

- Xenophon noted a direct correlation between conformation and functionality
- *Horses were not bred to stand still, so ultimately function is of primary importance*
- based on an *average*
- good conformation is an *intermediate optimum*
- as the parameters/limits are of what is normal or average are pushed, this will make a horse more/less suitable for a discipline
- as the parameter/limits are pushed, this may make a horse more susceptible to the development of specific unsoundnesses
- conformation is concerned with:
 - the correctness of bone
 - length
 - the measurement of the length of bones from end to end
 - angles
 - the measurement of the angle of joints where the bones intersect
 - musculature
 - proportions
 - balance
- conformation is a very reliable predictor of:
 - soundness
 - ability
 - suitability to a discipline
 - there are exceptions to every rule, however
- undesirable conformation is athletically limiting
- judging conformation is an evaluation of the degree of correctness of a horse's architecture:
 - bone structure
 - muscling
 - body proportions
- conformation analysis is the comparison of a horse to:
 - a standard or ideal
 - this will vary from:
 - breed to breed
 - discipline to discipline
 - another horse(s)

Conformation affects

- **orthopaedic health** aka *soundness*

- theoretically it is easier for a well conformed horse to stay sound
- a significant positive correlation has been noted between:
 - good conformation
 - good health
 - career longevity in riding horses (Jonsson, 2013)
- a study of conformation affecting soundness (Holmstrom, 2001) showed that horses that stayed sounder had a:
 - lower height
 - less inclined femur (85 degrees)
 - more closed hock angle (154 degrees)
- *unsoundness* is defined as a problem or injury that will affect the horse's future usefulness
- an unsoundness may cause lameness
- **longevity**
- *longevity* in horses has been defined as 'the time period that passes between birth and death of an animal, and may be a measurement of general soundness' (Wallin et al, 2001, 2000)
- *functional longevity* in horses has been defined as 'the ability to cope with training and competition'
- considered the single most important trait by horse people surveyed in both Sweden (Jonsson, 2006) and Ireland (Hennessey et al, 2008)
- it was noted that horses that compete in more than one discipline should be credited for that, although horses that compete in one discipline exclusively may do so for a variety of reasons, including owner/trainer preference for a single sport, a variable that is beyond the realm of the study
- the study '*Orthopaedic Health, Conformation and Longevity in Riding Horses*' (Jonsson, 2013) noted a significant positive correlation between conformation, soundness and career longevity
- a high proportion (50-70%) of culled riding horses are culled due to musculoskeletal lesions (Sloet van Oldruitenborgh-Gosterbaan et al, 2010)
- the best traits for predicting longevity are high scores for:
 - type
 - movement in hand, especially at trot (Jonsson, 2013)
- the best health status was found in horses with the following conformation traits:
 - intermediate size
 - well positioned necks
 - light fronts

- no major limb deviations
- correct movement at the trot (Jonsson, 2013)
- biomechanically, the most important aspects of conformation in relation to future longevity, health and performance are long lines in the neck and croup (Holmstrom and Philipsson, 1993)
- **movement**
- stride length
- largely determined by bone length and angles
- longer legs typically produce a longer stride
- there is a strong positive correlation between stride length and neck length
- range of motion of joints
- amount of suspension
- ability to jump
- in good form
- to a specific height
- ability to perform other specific tasks
- e.g., racing, reining, driving, etc.
- **ability**
- athleticism
- scope
- strength
- **suitability**
- form follows function
- conformation determines which disciplines a horse will be best suited for
- there is a significant correlation between dressage horses and the following conformation traits:
 - long neck
 - long sloping shoulder
 - long croup
- there is a less strong but still notable correlation between show jumpers and the following conformation traits:
 - well developed neck muscles
 - well developed haunch muscles
 - slightly sloping croup (Koenen et al, 1995)
- **itself**
- one conformation trait impacts another, and this can be either:
 - positive
 - sometimes one trait can counteract or minimize another, more negative trait
 - negative

- sometimes two minor flaws combined can create a big issue
- head, neck, and body conformation (position and length of neck, shoulder, back and croup) together are considered one of the most positive combinations of factors in determining future health, ability, and longevity,
- these three factors together have a less significant impact when considered along with other conformation traits due to the strong correlation to type (Jonsson, 2013)
- the highest negative cluster of conformation traits is found in:
 - neck position
 - toed in
 - small hock angle
- which together have a heritability of 0.14-0.15 (Jonsson, 2013)

Conformation is typically not affected by

- **the presence of blemishes**
 - *blemish* - an injury or imperfection that affects the appearance of the horse but does not affect its usefulness
 - a horse with a blemish will likely score lower in a halter or conformation class, but in a performance class will be judged and theoretically perform at the same level as any other horse with the same amount of training
- **fat**
 - experienced handlers know that having a little extra fat on a horse can often cover up some conformation flaws
- **colour and markings**
 - learn to look beyond the beautiful (or plain) colour and markings to see the 'real' horse underneath
 - that bright bay with lots of chrome may be more eye-catching than the plain dark bay beside him, but the bright bay may be less well put together
 - *look at the horse, not the colour*
 - recent research has proven the majority of people have a negative colour bias against non-solid (pinto) sport horses (Fisker Hansen, 2015)
- **turn out**
 - a well turned-out horse can appear to be better looking than his less well turned-out companion, so again, learn to look beyond turn-out to see the 'real' horse underneath

Conformation is heritable

- the horse's conformation will be a combination of what the horse's ancestors looked like
- *genotype*
- the set of genes in one's DNA that is responsible for a particular trait
- *phenotype*
- the physical expression or characteristics of that trait
- *heredity*
- condition/appearance/trait passed down from the genes or combination of several genes of the dam and sire
- movement characteristics are more heritable in trot ($h^2=0.24$) than walk ($h^2=0.15$)
- h^2 indicates heritability
- the heritability index estimates the part of variations that are due to genetic influences, calculated as:
 - $H^2=V_G/V_P$
- a heritability index of 1.0 indicates that a large portion of the variation is due to genetic factors
- the highest heritability is found in wither height (0.67) and cannon bone circumference (0.55) (Jonsson, 2013)
- carriage of canter has a heritability of 0.19 (Ducro et al, 2005)
- free jumping has a heritability of 0.32 (Ducro et al, 2005)
- stride length at trot has a heritability of 0.28 (Ducro et al, 2005)
- stride length at canter has a heritability of 0.20 (Ducro et al, 2005)
- in studies of hoof characteristics in two breeds, Icelandics and KPWN, heritability was found at 0.45 and between 0.12 to 0.27 respectively (Albertsdottir et al 2011; Ducro et al, 2009a)
- there is a low heritability of limb deviations, *except* in the case of cannon bone displacement (Jonsson, 2013)
- heritability of longevity in competition has been estimated between 0.10-0.20 (Braam et al, 2011) and 0.20-0.36 (Jonsson, 2013)
- in a study of Swedish Warmbloods, the genetic correlation between conformation and success in:
 - *dressage* was estimated between 0.17-0.65
 - *show jumping* was estimated at 0.22-0.24 (Viklund et al, 2010)

- in a similar study using KWPN, the correlation between conformation and success was estimated at:
- 0.67 for dressage
- 0.29 for show jumping (Ducro et al, 2007)
- *This shows that conformation is important for both sports, with conformation having **more** of an overall impact on dressage*
- *Environmental factors such as training methods, housing, etc. will also have a significant bearing on the outcomes*
- Some conformation traits are congenital
- *congenital* is a trait or condition present at birth
- may or may not be genetic in origin
- may be a growth disorder or developmental abnormality acquired as a foetus
- some develop or are noticed later in life aka *delayed developmental abnormalities*

Form to function

- One of these vehicles would be better to drive to the rodeo; the other would be better on Rodeo Drive



- ***Form to function is obvious to us with vehicles, but we often overlook it with our horses***
- humans have selected conformation traits through generations of breeding that will make a horse more athletic and more suitable for a particular discipline
- breed standards typify the intended use of the horse
- for example:
- Clydesdale
- a tall, heavy horse with a short, muscular neck, large feet and a vertical femur
- useful for pulling

- thoroughbred
- a light, rigid backed, long limbed horse with a straight hind leg and great cardiovascular capacity
- useful for running at speed
- Quarter Horse
- a short, stocky, heavily muscled horse
- a sprinter
- useful for working with stock
- when choosing a horse, consider its conformation in relation to its intended function
- trying to ask a horse to do a job he is not structurally suited for will lead to potential:
 - training problems
 - many resistances encountered in training are due to the horse being unable to perform the movement due to pain, or conformation that makes the task more difficult for the horse
 - stress for the horse
 - frustration on the part of both horse and rider
 - pain for the horse
 - minor pain will lead to compensation in movement and overall function
 - major pain will result in inability to complete the task
 - any pain can result in the horse overusing another part of his anatomy which in turn can result in compensatory soreness/lameness
- soundness issues
- soundness issues can be direct or compensatory/referred from another area (these are often the most difficult to diagnose)
- loss of money
- in wasted training days, showing fees, vet bills, care and medication, etc.
- loss of usefulness in the horse
- ethical decisions such as if/how to re-home an unsound horse, whether he should be put down, etc. (because it *can* come to that)

Understand type

- *type* refers to general shape and suitability or set of characteristics of a horse that is able to fulfill a purpose, *regardless of breed*
- *type* is more important than *breed* in evaluating a performance horse
- the best traits for predicting longevity are high scores for:
 - type
 - movement in hand, especially at trot (Jonsson, 2013)

- there is a strong correlation between conformation and health status as a predictor of future longevity, and type (head/neck/body conformation)
- *type* is the single strongest predictor (Jonsson, 2013)
- in a small study of elite horses and their riders, the best horses were described by their riders as having the best type
- it was noted that there was a strong correlation between type and *rideability*
- this suggests that horses possessing certain conformation traits are easier to ride as they are better suited to their job and therefore find their tasks easier to accomplish
- these horses would also, by extension, likely experience less pain, and fewer resistances and unsoundnesses
- what may be considered a fault for one type of horse may be an advantage for another type
- examples of types:
- *hunter* - any horse best suited for jumping (hunters, jumper, eventing) with a long, ground covering stride
- typically 16 hh or over
- long sloping shoulder arising from a prominent wither
- deep chest with well-sprung ribs
- straighter hind leg
- longer back, but well supported in the loins
- rounded croup
- low stifle joint
- good substance
- well muscled hindquarters



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- *hack* - elegant, good moving riding horses suited for upper level flat work
- medium length neck with moderate muscling and good crest
- well set back wither
- base of chest meets body fairly high up
- angle at point of shoulder 101-105 degrees
- strong loins with well muscled quarters
- straight, correct legs
- *draft* - any work horse; a heavy horse suitable for pulling
- large feet
- heavy bone
- short, heavy, muscular neck
- straight hind leg with an especially vertical femur
- *stock* - any horse suitable for western disciplines
- smaller stature
- heavy muscling in the hindquarters, gaskin and forearms
- can be built a little downhill or low in front
- shorter, muscular neck and back
- a tendency to 'stand under' in the hind legs
- *cob* - a solid and steady hack of stocky appearance, well adapted to carrying heavier riders
- longer, strong back
- good depth of girth
- good substance
- Consider, for instance, this 'ideal' Connemara



- this is the 2014 Canadian Champion Connemara
- he is a fairly typical *cob type*

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- the cob type has:
- a horse-sized body on pony-sized legs
- consequently, this type of horse is usually disproportionately long in relation to its height
- large feet and good bone
- (this pony could show more bone in the forelegs)
- good strength and is capable of carrying a heavier rider
- good muscling in the hindquarters
- a long but strong back
- well ribbed-up for good support
- good depth in heartgirth
- good length of bone and good angles at the joints
- the cob can still be athletic and capable of hunting, jumping, etc.
- a cob is also known for its more quiet temperament, making it suitable for children or older/less athletic riders
- here is the same pony in action
- he is just under 14 hh
- rider is 5'7"



Photo credit: Totem Photographic

What to look for when judging a horse for conformation

First:

- learn about conformation faults
- this tells you what to avoid
- learn what a 'good' horse looks like
- remember that *good* is just an average or, in other words, an *intermediate optimum*
- learn what the qualities of a *great* horse are
- this is what you need for an elite competition horse
- conformation qualities will vary from discipline to discipline
- this is much harder to discern

When judging a horse for conformation:

- remember that ultimately, any well conformed horse will have the following qualities:
 - sound
 - strong
 - well balanced
 - good range of motion in the joints
 - straight, efficient movement
- establish your purpose
- ***for our purposes, we will be looking at a horse that would be suitable for one of the Olympic disciplines***
- the role of conformation has a higher degree of importance when choosing a dressage horse than when choosing a show jumping horse
- heritability studies have shown that conformation influences success in dressage by up to 67%, whereas conformation only impacts show jumpers up to 29%
- conformation is *still important* when choosing a show jumper as this horse must be capable of withstanding the higher speeds and greater forces experienced in the sport
- **FIRST:**
- look at the horse from a distance
- consider balance and proportion
- **SECOND:**
- after this, you can put the horse under a microscope and take a closer look

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- when you look at a horse close up, first look at the feet before anything else
- *'no foot, no horse'*
- more than anything else, the feet can be deal breakers
- the best conformed horse is of no use or value if he has bad feet
- view the horse from:
 - the front
 - the rear
 - both sides
- the horse must be symmetrical
- the horse must exhibit *vertical congruity*
- compare the left side to the right side
 - do this with the legs (and not just the lower legs)
 - consider foot size and shape, bones and muscling
 - don't forget the face, as well (eyes, ears, nostrils)
- if possible, view the horse from above/behind
 - the horse should be straight down its spinal column
 - the horse should be even in the hips and shoulders
 - the horse should be triangular
 - wider at the back
 - narrowing toward the front
 - wide across and short through the loins
 - the hindquarters must be wider than the shoulders



- look in the mouth
- look at the incisors from both sides
- try to look at the molars
- look at the tongue on both sides
- take a look at the upper palate
- consider the size of the oral cavity
- feel the legs
- pick up the feet
- look at the wall, the sole, the frog and the heel
- feel the tail bone
- check out the throatlatch area
- look up under the sheath/udder area
- When discussing conformation (e.g., for a test):
- try to develop an organized, systemic approach
- start at the front, work to the back
- start at the top, work to the bottom
- When analyzing a photograph for conformation, you are at a huge disadvantage compared to analyzing the horse in the flesh
- you are at the mercy of the pose
- optical illusions can appear based on how the horse is posed and what angle the photo is taken at
- a shrewd handler will know the tricks used to hide flaws
- Remember that, as my old vet Dr. John Gilray always said, *the perfect horse has yet to be born*
- your job when judging conformation is to notice *both the good qualities and any bad* traits of this horse, and then decide:
- what you think he can do best (discipline)
- to what level (scope/ability)
- how he will stand up to the work (potential soundness/unsoundness; longevity)

The two primary considerations when judging conformation:

Historically, it has long been accepted that the two main criteria for judging conformation are:

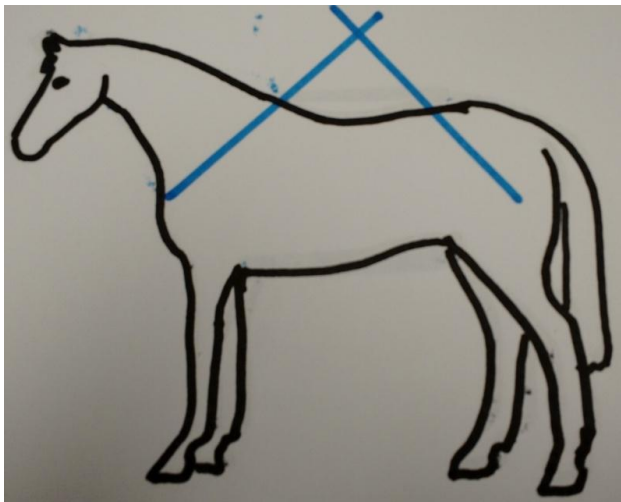
- **balance**
- **structural correctness**
- relative angles between body parts (Wrangel, 1887)

Balance

- Internationally renowned German dressage trainer Conrad Schumacher says, " *The horse must look impressive from 60 m*"
- Why 60 m?
- How long is a dressage ring? How far away is the judge sitting when you enter the ring? If you're showing, your horse has to catch the judge's eye even before you enter the ring
- what we are seeing here, often without realizing it, is balance and proportion
- Also, if you start looking at a horse's conformation from a distance, you will be more likely to notice what is **good** about the horse
- *we keep and use a horse based on what is good about him, not based on what his weaknesses are*
- if you look at a horse from close up first, it's like looking at the horse under the microscope
- you will notice all the little things, and likely see some bad things, and possibly reject him on this basis before identifying the bigger and more important good things
- Balance is the most important quality
- Balance is the equal distribution of weight
- it looks at how well the major body parts fit together
- it indicates how proportionate a horse is
- it implies how athletic he will be
- The well balanced horse will:
 - move more efficiently
 - experience less physical stress
 - this lessens the likelihood of injury
 - when moving, one easily observable **measure of natural balance** is:
 - *digital advanced placement*
 - with *digital advanced placement* the horse at trot places its diagonal hind foot on the ground an instant before the front foot hits the ground
-



-
- the above pony, pictured at 4 years of age, is relatively unschooled with only 6 months training, is being ridden by a 12 year old, but shows good natural balance under saddle as evidenced by *digital advanced placement* (DAP)
- DAP in this example is not influenced by either riding or training
- Balance = equal distribution of weight from
- top to bottom
- front to back



-
-
- a well balanced horse will be able to stay better balanced when mounted
- the angles of the horse's shoulder blades compared to the angles of the horse's hindquarters are an indicator of balance
- consider where the rider would sit
- a rider who is put out of balance will further unbalance a horse

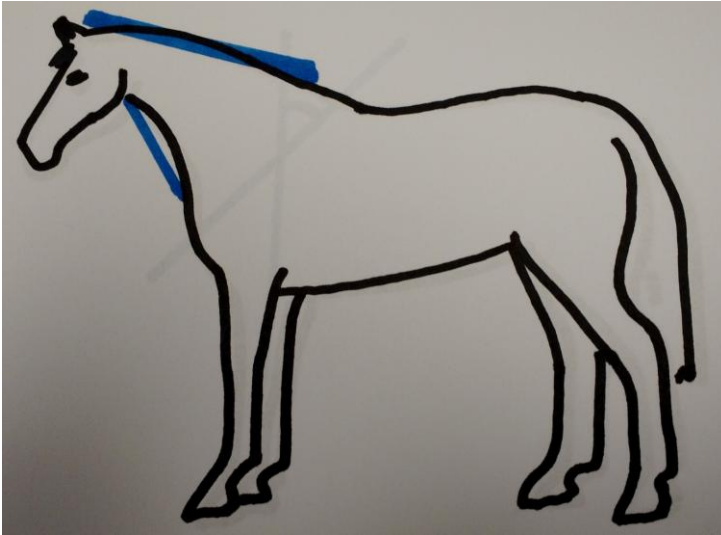
- another indicator of balance considers how easy it is for the horse to lighten its front end



- a plumb line dropped vertically down the foreleg should bisect the foreleg evenly, providing support
- it should enter the heel area of the foot (also provides support)
- the further in front of the withers it emerges, the lighter the horse
- the higher the base of the neck, the easier it will be for the horse to be light in front
- side to side
- the balance of the horse not only influences horse's movement, soundness and scope, it also affects his ability to carry a rider in balance
- straightness and symmetry are key

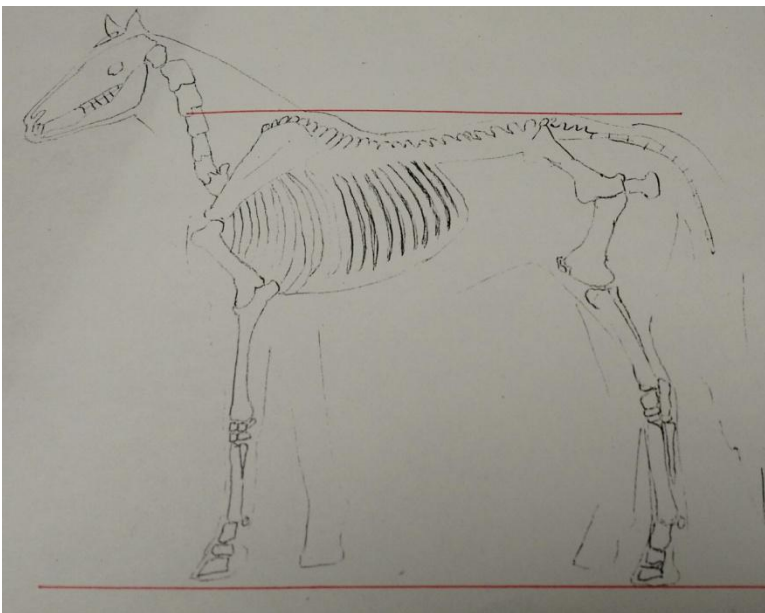
● Proportion ratios

- balance is influenced by the following proportion ratios:
- length of neck and shoulder to length of back and hip 1:1
- length of neck to length of back 1:0.67
- heartgirth depth to leg length 1:1
- length of scapula to length of humerus 1:0.5
- neck length to hind leg length 1:1
- throatlatch depth to length of head 1:1
- head length to measurement from outer eye to outer eye compared 1:0.5
- head length to length of crest of neck 1:1.5
- length of body to length of neck 1:0.33
- length of back to length of hip 1:0.67
- topline of neck to underline of neck 2:1



top to bottom

- 1. the topline (withers and croup) should be level or the withers slightly higher than the highest point of the croup



- a line drawn from withers to croup should be approximately parallel to the ground

- the front and the back should carry approximately equal amounts of weight

- lower in front = more stress on forelegs

- less lightness

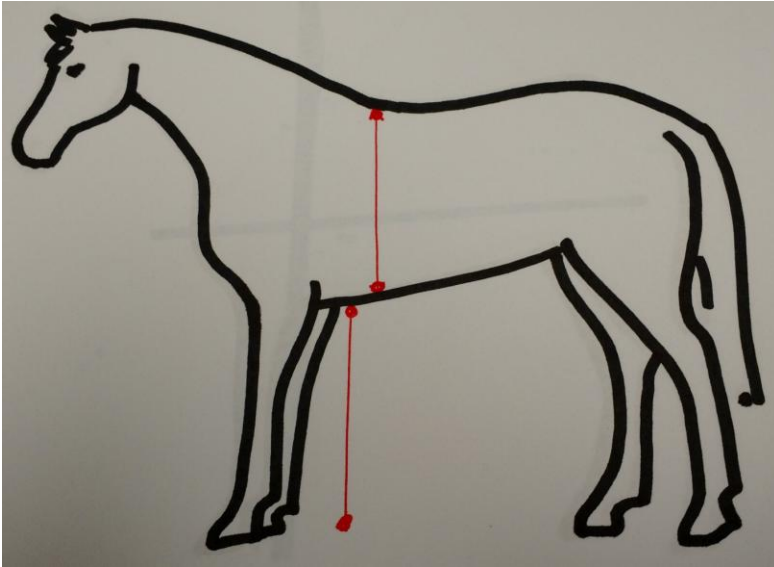
- harder to engage = less power

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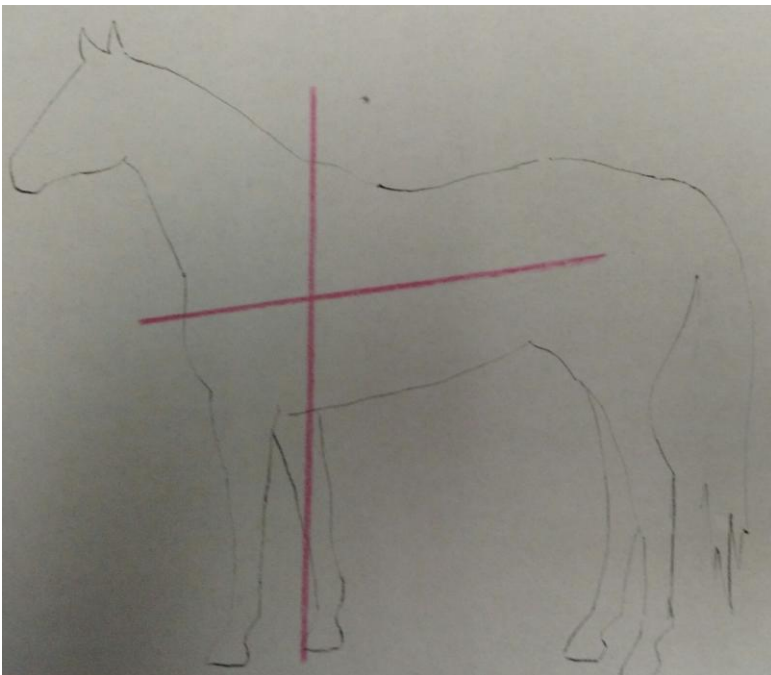
- lacking manoeuvrability
- *do remember that young horses grow quarters first, then the front end catches up, so at various times the young horse may appear downhill, but this may not be your final product
- 2. top versus bottom line ratio
- the horse should have a shorter topline (withers to LS joint) compared to bottom line (measure taken from elbow to stifle)
- longer topline
- weaker back
- harder to engage
- less power
- less manoeuvrability
- harder to adjust stride



-
- the horse, when measured from elbow to wither, should be the same measure as from elbow to ground
- of note: from the time a foal is born, up to a week old, you can approximate its adult height by measuring it from the ground to the point of shoulders, and then doubling that



-
- *front to back*
- *centre of gravity (COG)*
- COG is the theoretical point around which mass is evenly distributed
- the horse's centre of gravity is one of the single most important factors used to determine use, suitability and athleticism
- COG is found at the intersection of the lines made from:
 - (vertically) withers down to the ground
 - (horizontally) from the intersection of the neck and the chest, back of the point of the buttock

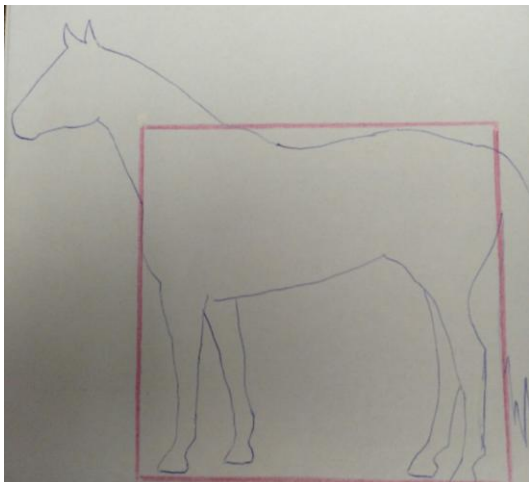


- COG will change as the horse moves (shifts further forward)
- horses learn to rebalance the COG when moving and when being ridden
- COG is different from the centre of the horse
- COG is critical
- COG is essential for:
 - quality of movement and performance
 - enabling a horse to carry itself for:
 - easy manoeuvrability
 - power
 - better movement
 - enabling a horse to carry a rider while maintaining its balance
- COG is determined by bone structure
- a common flaw:
 - a back that is too long in relation to the neck and the hip

Proportion

There is a strong correlation between a horse being proportionate and a horse staying sound through its career due to:

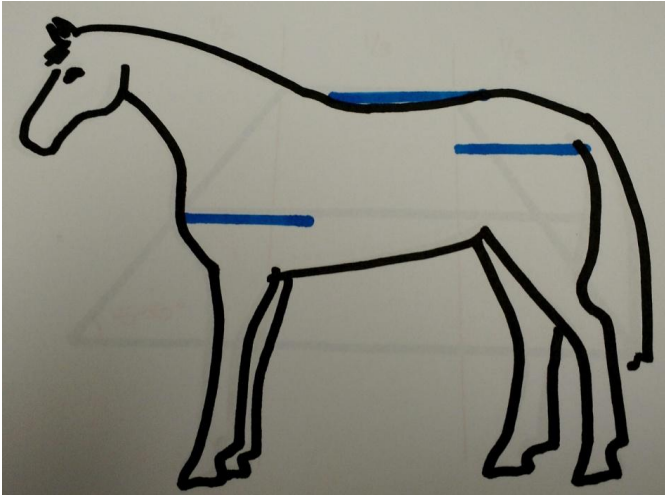
- even loading of:
 - joints
 - muscles
 - ligaments
- lack of rotation in limbs
- positively influences orthopaedic health
- also results in better movement



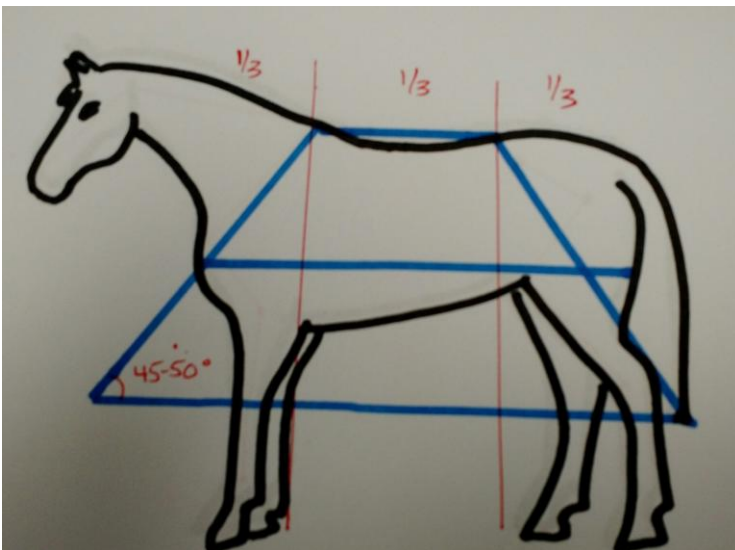
- length for a horse competing in Olympic disciplines can be up to 10% longer than height
- if the horse is longer than 10%, the legs will be too short comparatively, causing:
 - shorter, choppier stride
 - the horse can also have trouble with synchronization of its limbs
 - this is often more readily evidenced with the flying change
- if the horse is much shorter than that, the hind legs may interfere with the front
 - forging
 - over-reaching
- the length of the horse from ground to elbow should equal the length of the horse from elbow to withers
- being proportionate indicates that a horse will be able to stay balanced when in work
- a proportionate head is important in maintaining balance
 - the horse uses its head and neck as ballast
 - the head alone weighs approximately 18 kg (40 lbs)
 - the width of the face should be the same measure as the length from poll to mid-face



- the neck, shoulder, back and hip should be approximately equal length



- neck length can be equal to or slightly greater than back length
- a shorter neck leads to
- decreased flexibility
- a horse that's harder to balance
- a longer back leads to
- a horse who gets hollow
- a harder time lifting and rounding the back
- a harder time moving the hind legs up under the centre of gravity (COG)
- the hip, from the loin to the point of the buttock, should equal $\frac{2}{3}$ of the back length
- a shorter back leads to a lack of impulsion
- the horse should be divided into thirds equally through the shoulders, barrel, quarters



Smoothness

- the smooth blending of all the major body parts
- major junctions include the:
 - head and neck
 - neck and torso
 - forehand and torso
 - the torso should **not** appear to blend seamlessly to the shoulder
 - the *shoulder girdle* is an attachment that requires the horse to use its head and neck to balance the motion of the hindquarters during engagement
 - the shoulder girdle should be well defined
 - torso and hindquarters
 - this is one area where we often see a weakness, especially noticeable in the area of the lumbar-sacral joint in the loin area
 - this will show up as either a dip right in front of the LS joint, or as a rough and bumpy LS joint itself

Quality and refinement

- overall appearance
- appealing head and neck
- quality of bone and muscle
- thickness of hair coat
- texture of skin
- tightness of skin
- NB: some of these qualities can be improved with good care and management

Correct way of going

- typically, the proof is in the pudding
- a well conformed horse will likely move well, and a poorly conformed horse will likely not move well
- what is important in the way a horse moves:
 - balance
 - *digital advanced placement* is a good indicator of natural balance
 - note that balance under saddle can be improved with training

- balance under saddle can be positively or negatively influenced by good/poor riding
- cleanness
- no interference
- quality
- freedom of movement is especially evidenced in the shoulders
- good hind limb energy is essential
- straightness
- important for efficiency
- regular weight bearing
- good, even rhythm
- stride length
- ground covering stride
- arc of stride
- how much the horse uses its knees and hocks (engagement)
- the horse uses its head and neck as a rudder
- this stabilizes the horse
- free head and neck movement has a profound influence on the horse's way of going
- this is true both on the flat and over fences
- the head and neck is used as a pendulum to help balance the horse
- used especially when jumping, and in canter and gallop
- the head and neck is used like a piston when the horse gallops
- used a little less at walk
- used the least at trot due to the two beat nature of the gait
- also observable when the horse is unsound and he bobs the head
- the back is also an important factor in movement
- the back is often referred to as the '*Fifth Leg*'
- the back transfers the energy generated at the rear of the horse to the front
- a well conformed back will aid in good movement
- the back is an important factor in the coordination of the hind limbs
- the horse should have three good quality gaits
- movement in trot is important as a receipt of how all the combined conformation and health traits of a horse interact and influence overall functionality of a horse (Jonsson, 2013)
- walk and trot in hand provides the most significant information for predicting future longevity (Jonsson, 2013)
- however, one study found that correctness of walk has little impact on functionality in performance sports (Ducro, et al 2005)

- canter has more of an impact, both for jumpers and for upper level dressage horses, simply because more time is spent in this gait
- in the case of jumpers, they are in this gait exclusively during competition
- an old adage says, "*Buy the walk and canter; make the trot*"
- the walk and canter in the raw state cannot be improved much
- quality of walk is the least changeable if you are trying to improve it
- a rider can 'kill' a walk with poor riding and incorrect training
- strength training can make the horse more able to sit at canter
- the trot in the raw state can be improved often significantly with correct training and conditioning
- leg conformation significantly influences the horse's movement
- straight correct legs allow for:
 - the maximum range of motion in the joints
 - the horse to move cleanly with no interference
 - a good length of stride
 - degree of suspension

Height

- bigger is usually considered better
- judges will, if given two horses that are the same in all other ways, typically pick the bigger horse
 - a large size can make a horse look very impressive compared to a small or average sized individual, but again, learn to look beyond this
- taller horses have a lower stride frequency and a longer stride length
 - this means they will have a longer, slower stride
 - that is a significant positive
- a positive correlation for soundness *and* longevity has been found between:
 - higher than optimal wither height and talent scores in dressage
 - this has been found to be less true for show jumping (Jonsson, 2013)
- however, care should be taken to not exceed optimal heights for soundness
 - there is a weight bearing limit for:
 - bones
 - joints
 - soft tissues
 - hoof walls
- studies have shown a correlation in elite dressage horses between lower height and improved soundness (Holmstrom, 2001)

- disproportionately large size can have a negative impact on soundness (Holmstrom, 1990)
- from a study done on the KWPN population doing basic dressage and lower level jumping, it was noted that the tallest horses were at the highest risk of being culled (Ducro et al, 2009b)
- there is a negative correlation between being both too tall and too small, and health, longevity and success in competition (Jonsson, 2013)

Other Considerations

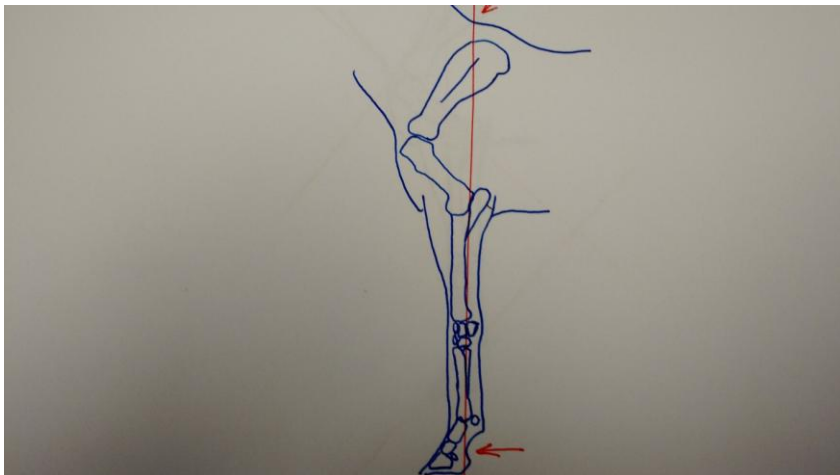
- Some other considerations when viewing a horse for conformation include:
 - **breed**
 - how well a horse represents the standard for its breed
 - this information can be found on the websites of most breeds
 - this is less important than balance, structural correctness and way of going
 - **sex**
 - the male of the species will typically be bigger and more muscular
 - note that when breeding horses, the mare is considered to be more important than the sire due to the offspring inheriting more mitochondrial DNA from the mother
 - *mitochondrial DNA* = mtDNA - containing structural genes generally inherited only through the female lines
 - **age**
 - evaluating the horse at different ages can be tricky
 - a week old foal can give you a reasonable idea of how tall he will be as an adult
 - much can change in a horse between being born and reaching adulthood
 - some leg crookedness can be corrected if treated early
 - horses that grow too tall, too quickly have been known to develop structural weaknesses that were not evident at birth
 - a yearling and young horse will grow croup high prior to the front end catching up
 - you cannot really evaluate a horse for balance accurately during these growth spurts

- an aged horse may lose muscling and therefore look less impressive than he did in his youth, even though he is still structurally correct



Structure = architecture

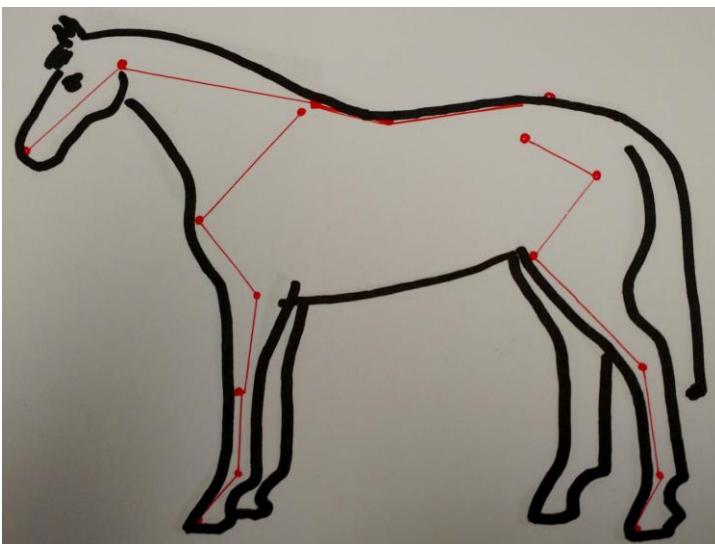
- the architecture of the horse is akin to his structural correctness
- structural correctness provides the horse with *mechanical advantage*
- this is necessary for:
- support
-



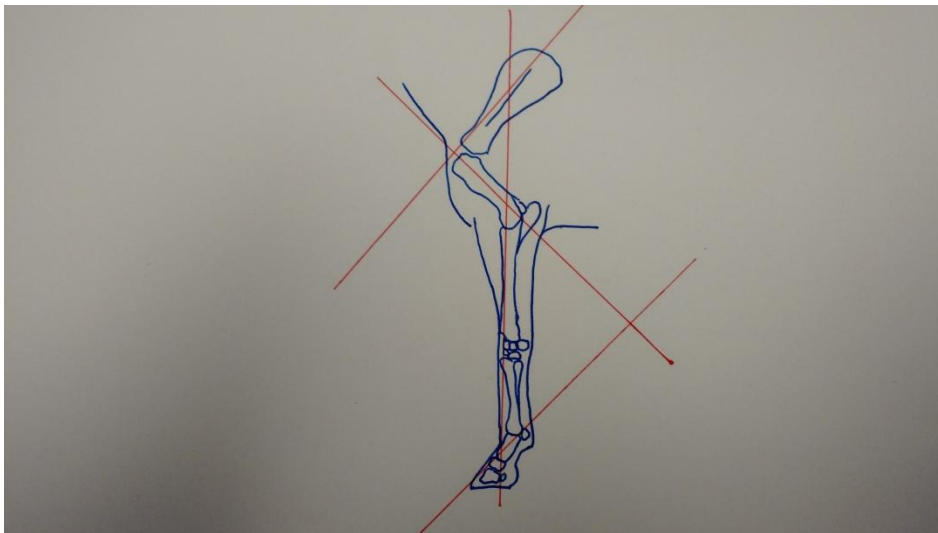
- the horse carries 60%+ on his forelegs
- some refer to the foreleg as the *pillar of support*
- soundness
- clean movement
- these factors are determined by the structure and alignment of bones
- it is closely linked to balance
- from this you can predict how the horse moves and jumps

Angle and Length of Bones

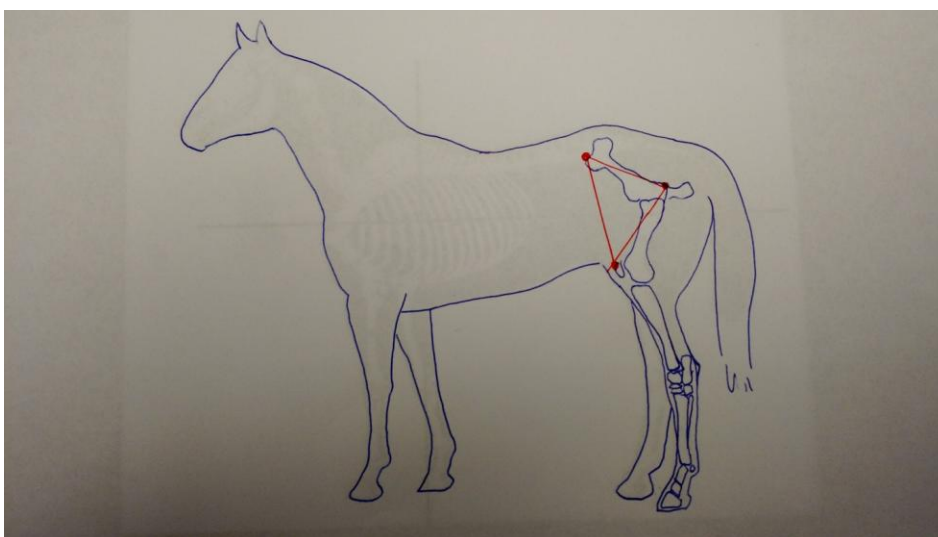
- 17 anatomical markers are used to measure joint angles and bone lengths (Langlois et al, 1978)
- this is referred to as *functional morphology*
- this is a landmark based science that studies the qualitative analysis of form using traditional measures of:
 - angles
 - lengths
 - width
 - mass
 - ratios
 - areas
- the use of these *morphometric* measures is not new
- Stratul (1922) and Radescu (1923) looked at performance in thoroughbreds, while Nicolescu (1923) studied Hanoverians, but all noted the connection between conformation and performance, observing larger or smaller measures from the norm in lengths and angles of the better performing horses



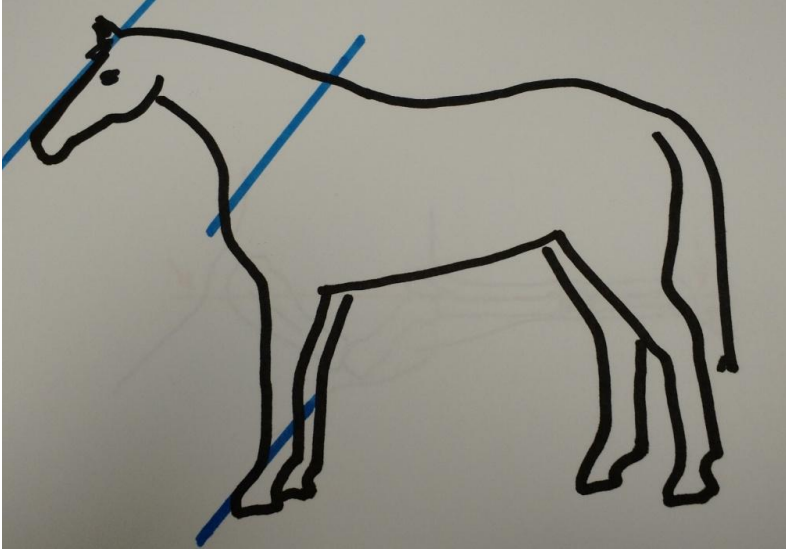
- dorsal line (top line) measurements
 - from the middle of the nostril (nares)
 - to the wing of the atlas (first cervical vertebrae)
 - to the withers
 - to the lowest point of the back
 - to the tuber sacrale (highest point of croup)
- foreleg
 - from the proximal end of the scapular spine (withers)
 - to the major tubercle of the humerus (point of shoulder)
 - to the lateral collateral ligament of the elbow joint
 - to the lateral tuberosity of the distal end of the radius (just above the knee)
 - to the intersection between the lateral tuberosity of the lateral suspensory ligament and the palmar annular ligament (fetlock joint)
 - to the toe
- hind limb
 - from the cranial part of the tuber coxae (the hip bone)
 - to the caudal part of the major trochanter of the femur
 - to the middle part of the lateral patellar ligament (stifle)
 - to the distal part of the calcaneus (hock)
 - to the intersection between the distal part of the lateral suspensory ligament and the plantar annular ligament (fetlock joint)
 - to the toe
- joint angles
 - the angles of the major joints, especially those in the fore and hind limbs, will help to determine suitability and scope in a horse and will also influence movement and soundness
 - from a study done of elite dressage prospects (Holmstrom, 1990), the following range of joint angles were recorded:
 - elbow angle 139-140 degrees
 - shoulder angle 101-105 degrees
 - scapular inclination 54-59 degrees
 - hip angle 88-95 degrees
 - stifle angle 123-128 degrees
 - hock angle 150-157 degrees
 - coxal inclination 23-26 degrees
 - femur inclination 64-71 degrees



-
- the inter-relation of bone angles, particularly in the hindquarter, help to determine suitability to a discipline
- an equilateral triangle is considered an intermediate optimum
- it is also the most suitable for the jumping horse
- a horse with a more open hip angle will be better suited to dressage



-
- bone angles
- there are a number of bone angles that should match
- profile of face
- scapula
- pastern bones



-
- bone length
- the length of the major bones, especially those in the fore and hind limbs, will help to determine suitability and scope in a horse and will also influence movement and soundness



-
- the length of the ischium is very important (see above)
 - it helps to create a longer hindquarter, which provides more area for muscling, resulting in more power
 - the ischium is sometimes referred to as the *pump handle*

the longer the ischium, the longer and more efficient the stride

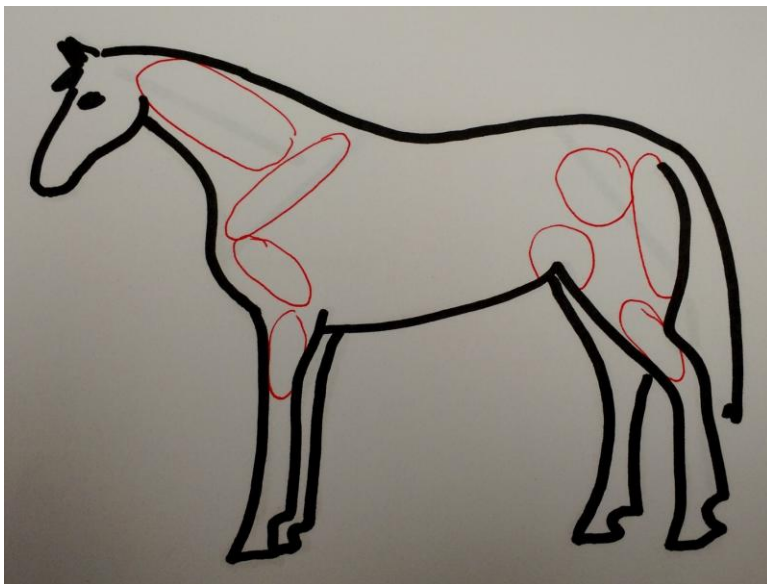
therefore, this is a conformation trait commonly seen in racehorses

one negative associated with an extremely long ischium in mares is a rise in infections of the urogenital tract

- in a study done of elite dressage prospects (Holmstrom, 1990), the following average bone lengths were found:
 - scapula length (m) 0.50-0.53
 - humerus length (m) 0.29-0.33
 - radius length (m) 0.40-0.44
 - metacarpus length (m) 0.28-0.32
 - front phalanges 1-3 length (m) 0.25-0.28
 - ilium length (m) 0.33-0.36
 - femur length (m) 0.41-0.43
 - tibia length (m) 0.47-0.51
 - metatarsus length (m) 0.36-0.37
 - hind phalanges 1-3 length (m) 0.24-0.27

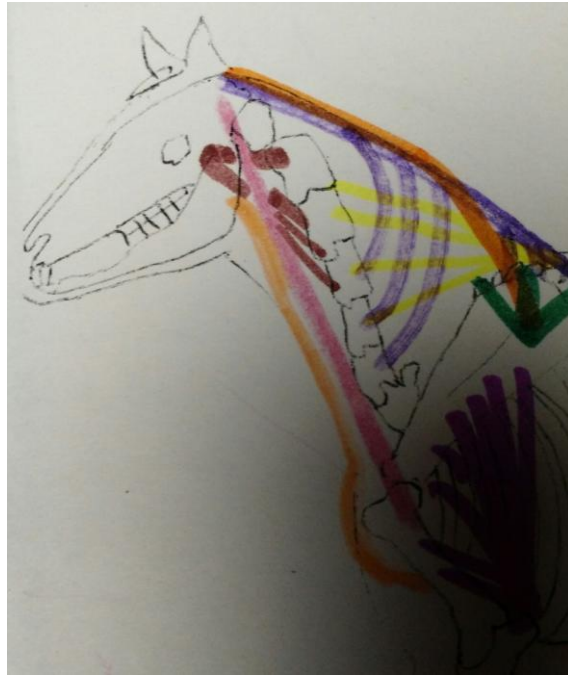
Muscling

- muscling is important as it directly influences:
 - strength
 - suitability
 - appearance
- muscling is the powerhouse of the horse



- however, muscling is *less* important than:
 - balance
 - structural correctness
 - way of going
- *purpose:*
 - powers horse
 - helps support horse's skeleton
 - helps to strengthen horse's joints
- muscling is often influenced by breed
- muscling can change with:
 - feeding
 - conditioning
 - age
- note that the horse has no muscling below the knee and the hock
- the three things that are more important with muscles are:
 - distribution
 - not changeable
 - delineation
 - somewhat changeable
 - development
 - changeable
- look at:
 - length of muscles
 - long muscles allow for more endurance and longer stride
 - short bunched muscles have huge propulsive force but tire easily
 - this is often a breed characteristic
 - quantity
 - quality
 - definition aka *delineation*
 - expression or ripple of muscle
 - volume
 - overall amount of muscle
 - amount of muscle strength
 - dressage horses are power lifters
 - their work is always aerobic, never anaerobic
 - dressage horses work within their oxygen carrying capacity
 - this creates a situation where they have so much body mass per surface area of skin that they cannot lose heat as effectively as a less muscular horse
- distribution of muscle:

- neck
- note that most of the horse's neck is comprised of muscle



-
- front of chest
- front view - the pectorals
- an inverted V created by the front legs
- this is very important
- shoulders
- the triceps muscles immediately behind the scapula are extremely important for take-off when jumping
- forearms
- long and smooth muscling is desirable over short and bunched muscles
- back, loin and croup
- should be smooth
- should flow together seamlessly
- the back muscles help to bear the weight of the saddle and rider
- the loin muscles are extremely important in transferring energy forward and helping to support this part of the back
- the croup muscles are very important for propulsion
- buttocks and thigh/stifle
- together, these are the most important muscles in the horse
- the muscles in the hindquarters, especially the gluteals and the hamstrings, are extremely important for propulsion

Canadian Pony Club Education - Conformation

- used in all disciplines
- muscle in the stifle should be the widest part of the horse (viewed from behind)
- well defined
- not bunched



- the more muscle depth the horse has between stifle and hamstrings, the stronger the horse
- the quadriceps muscles support the stifles
- gaskin
- should be wide
- should be well defined
- evenness of distribution of muscling on both sides
- this is very important to achieving the steps in the Training Pyramid
- rhythm
- suppleness
- contact
- straightness
- impulsion
- collection

Conformation Class

When looking at a horse in a photograph, consider:

- pose
 - is the horse standing square?
 - is he on even ground?
 - is a hind leg obscured by tail?
- angle
 - do you have a clear view of forequarters and hindquarters?

Ultimately, seeing a horse in real life and being able to watch it move will give you the most accurate information

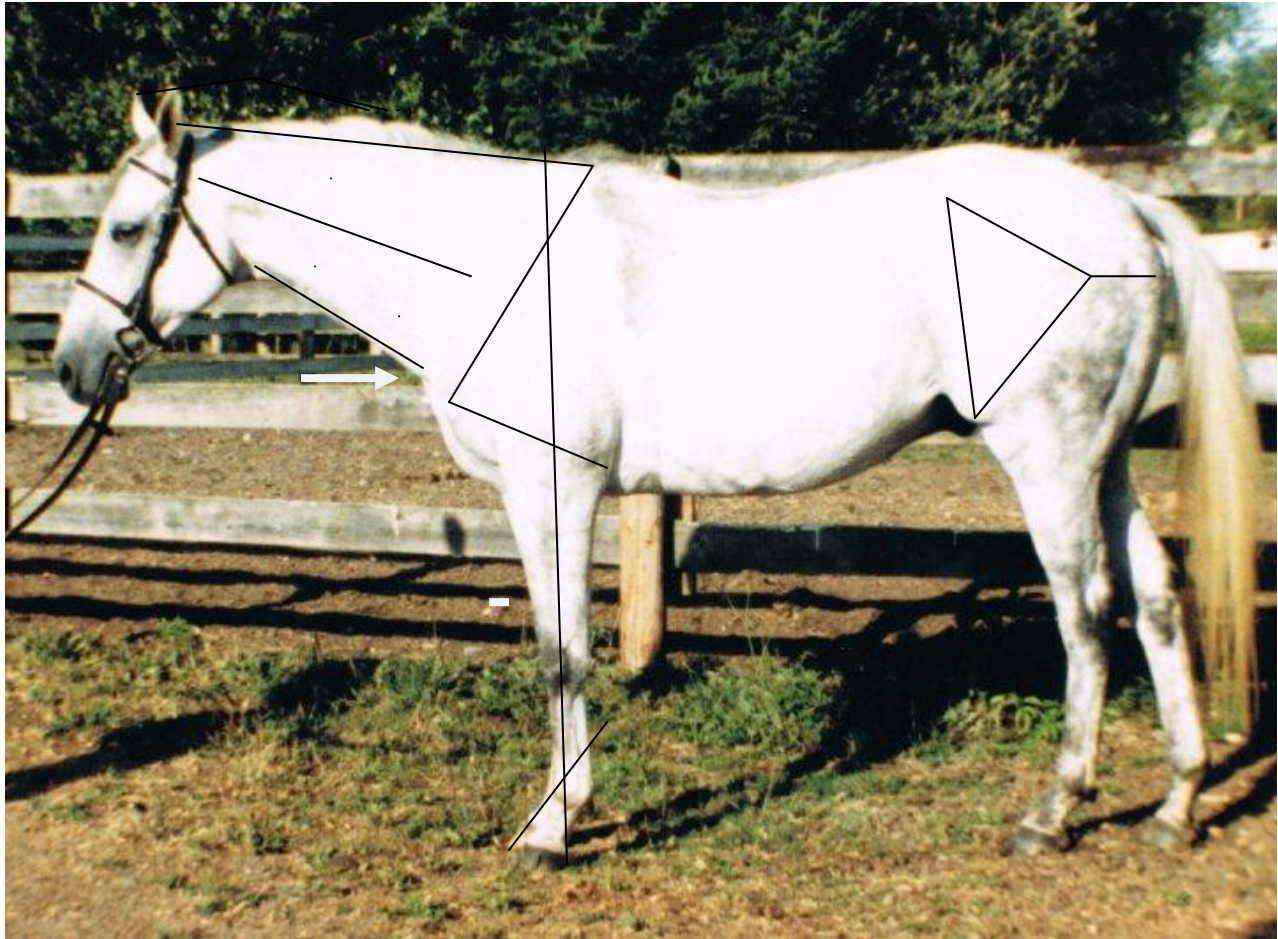
- a photo only provides you with about 30% of the necessary information
- you cannot see:
 - the other side
 - front view
 - hind view
 - close up of feet, interior of mouth, etc.

Consider these three thoroughbred geldings:



Horse #1:

8 year old thoroughbred gelding, 15.1 1/2 hh (Native Talent X Never Out by *Cortil)



Performance history:

- started at the track as a 3 year old, ran three times, did not place
- started his competitive career as an event horse, went Training level for 7 years finishing in the top ten in the province every year
- finished his show career as a dressage horse still competitive at Third level in his twenties
- retired sound at 27.

Overall balance and proportion:

- good
- head appears slightly large in relation to rest of body
- horse appears to be slightly downhill in this photo (just the angle of the photo)

Pillar of support:

- Excellent
- good support in the heel region and the line coming out in advance of the withers, indicating lightness (this horse was very light)

Front angles:

- Very good
- slightly more open comparatively
- good length of scapula and humerus

Hind angles:

- Good
- stifle could be lower for more scope
- Hind leg angles on this horse in the hock appear quite straight which typically would make him a good race horse (he wasn't) and make it harder for him to engage (not an issue for him)

Other:

- this horse had exceptional feet
- neck appears to be set on a little low
- this is less noticeable when the horse is moving due to his ability to engage
- back appears to be well supported
- this horse had exceptional suspension at trot and great ability to 'sit down' at canter
- when jumping, this horse had good strength behind, but was borderline satisfactory/good with his front end over fences - could get forearm horizontal and knees square, but did not go above the horizontal and had a harder time folding and being tight below the knee, so therefore had to jump a bit higher once the fences got bigger

Horse #2:

14 year old thoroughbred gelding, 16.1 1/2 hh (Native Talent X Never Out by *Cortil)

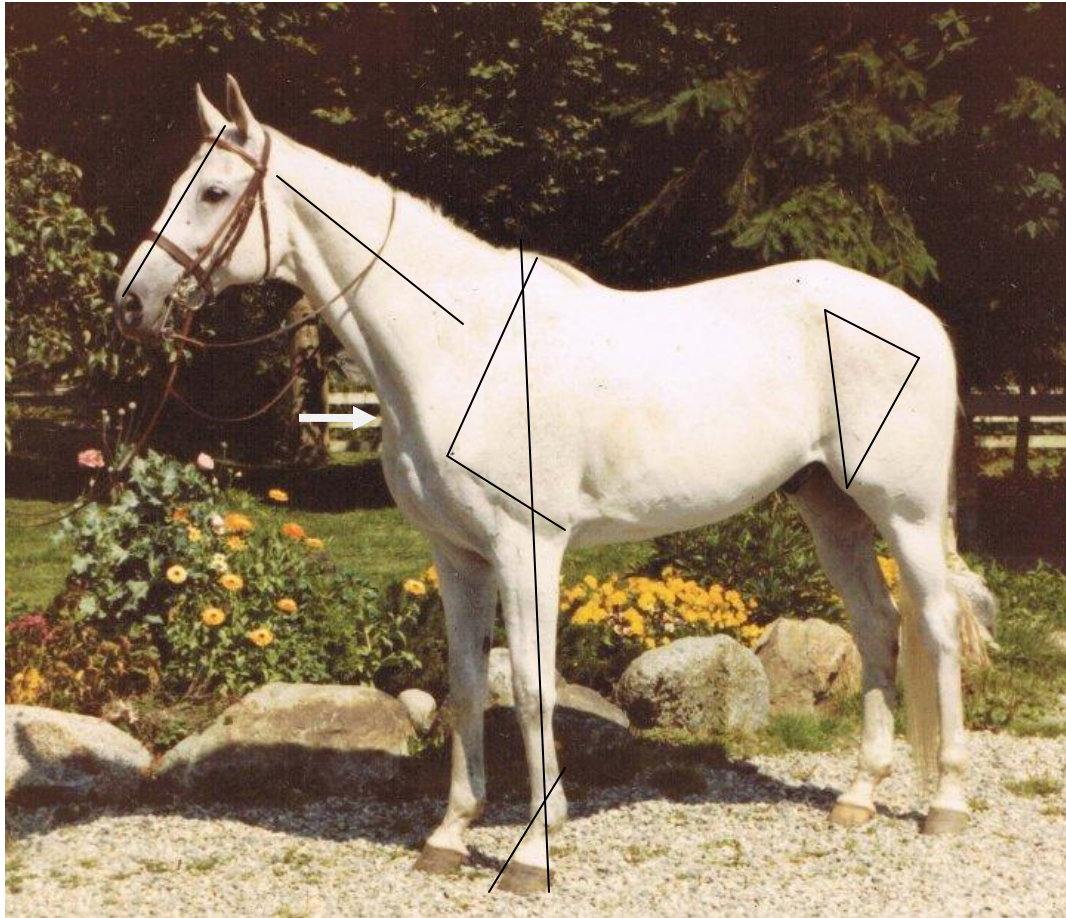


Photo credits: Maynard Photography

This horse started at the track as a 2 year old, ran until age 5, was a stakes placed allowance winner. He started his show career as a show ring hunter (competed up to 4'6" or 1.4 m), segued into Intermediate Jumpers (+4'6" or 1.4 m), competed successfully at NAYRC in eventing, and finally finished his career as a dressage horse competing at Second level. Retired sound at age 24.

Balance and proportion: appears very good, neck is perhaps slightly short compared to length of back

Pillar of support: good, with good support in heel and line emerging at top in front of withers, indicating lightness (which he was) - horse stands slightly over at the knee

Front end angles: excellent, open angle, with good length of bone in scapula and femur

Hind quarter angles: excellent, wonderful length of femur and a low, well set stifle indicating lots of scope

Hind leg angles are hard to assess from this viewpoint but were excellent

Other:

- Throatlatch could have had more definition
- Base of neck placement is excellent and top of neck comes up out of body at a good angle
- Muscling is very good
- This horse has a very good depth of heartgirth
- This horse is very well let-down with a longer forearm and shorter cannon bone
- This horse had feet that were just satisfactory - tended toward being shelly walled and thin soled
- He was an excellent mover with good suspension
- Over fences he used himself very well

17 year old thoroughbred gelding, 15. 3 1/2 hh (Bud n'Bob X Holly Harvest by Agha Alibhai)



This horse went to the track but did not start. He started his show career in the hacks and eventually became one of the top hunters in the Pacific Northwest (3'6" division). Semi-retired at age 18 due to laminitis.



Photo credit: Maynard photography

- Balance and proportion: this horse is well balanced with good proportion

Canadian Pony Club Education - Conformation

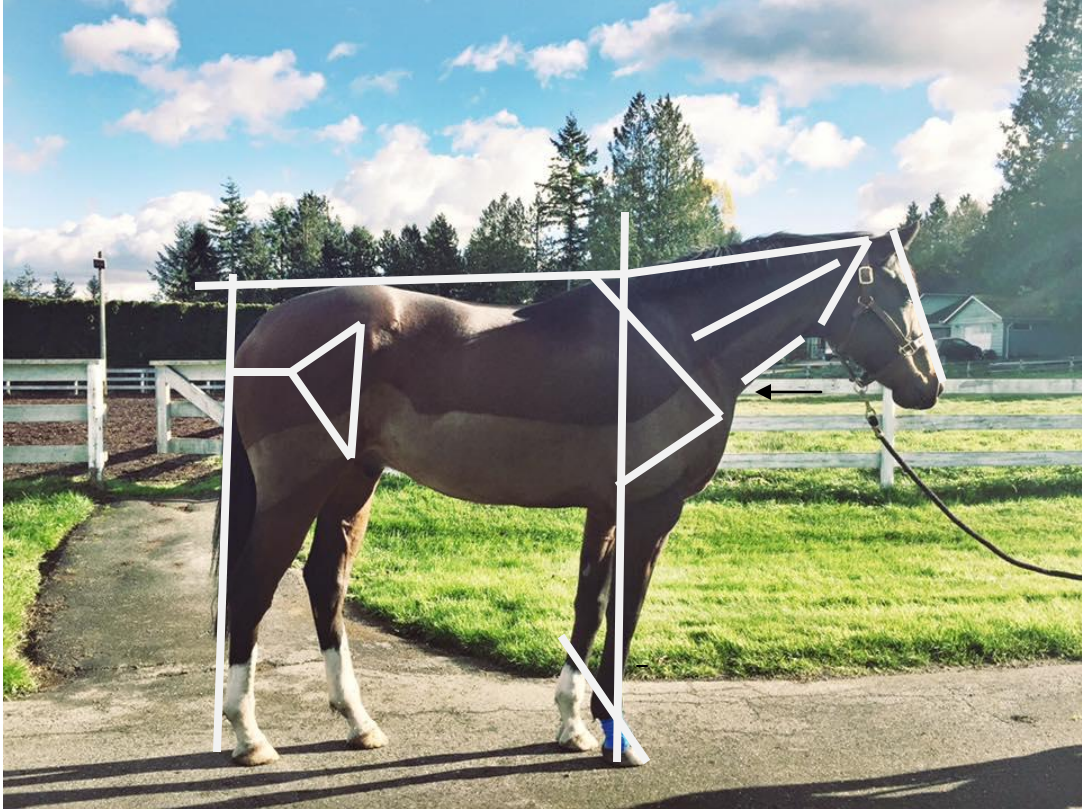
- Built uphill
- Pillar of support: this horse has an exceptional pillar of support
- Front end angles: Has a very open angle at the point of shoulder, and good length of bone
- Hind quarter angles: Good angles, stifle could be a bit lower for more scope
- Hind leg angles: Very good
- Base of neck arises out of body a little low
- Could show more refinement in throatlatch
- Top of neck appears little cresty (this horse was left a stallion until age 5;
- he also did succumb to laminitis at about the age pictured)
- Muscling: excellent
- Feet: were excellent until he had an adverse reaction to medication later in life, resulting in laminitis

Other:

- On the flat, was an average mover
- Over fences, was exceptional in his ability to use his body, rotate his shoulder, get knees up, and bascule over the fence

Try:

Horse Discover KY 4-H Horse Program (quiz ww2.ca.uky.edu External Anatomy) Cooperative Extension Service, University of Kentucky, College of Agriculture



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