

# Horse Conformation Analysis

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Conformation analysis is the systematic comparison of one horse to another and all horses to an ideal type for the breed or athletic purpose. One conformation analysis system is known as BSMQTT: Balance, Structure, Muscling, Quality, Type and Travel. Start your conformation analysis by becoming familiar with the parts of the horse.

## Balance

The ideal light horse will be balanced, as determined by dividing it into three sections. Draw imaginary lines separating the shoulder area, body and hindquarters. A horse can be divided equally only if it has a long, sloping shoulder, short back with a corresponding long underline and a long hip. The head and neck should not look excessively large or small when compared with the rest of the body. The legs should be about the same length as the heart girth.

## Structure

### Head and Neck

The head and neck are important in determining the athletic ability of the horse. A supple horse uses its head and neck as a rudder and stabilizer. Free head and neck movement have a profound influence on the horse's way of going. For a horse to be well balanced, the neck should be long and lean with the head size in proportion to the rest of the body.

**Head** – The head should follow the type of breed and be finely chiseled with good definition of the bony framework.

The head should be triangular when viewed from the side. It should have large, powerful jaws and taper to the muzzle. The profile should be a straight or slightly dished face, as opposed to an arched or Roman nose. As viewed from the front, the forehead should be wide between the eyes, tapering to the muzzle.

**Neck** – The head should attach to the neck in a manner that provides ample movement and flexion without impairment of the air passages. The throatlatch should be clean, trim, well defined and capable of great flexion. A short, thick neck is often correlated with a thick, unyielding throatlatch incapable of flexion. In some breeds, a slight arch or crest on top of the neck is desirable, but an excessive crest, thick upper neck or broken crest (lop neck) are undesirable because they can interfere with flexibility.

A stallion should carry more crest than a mare. A thick “studdy” neck on a mare is usually associated with a lack of feminine appearance. The underline of the neck should be straight and attach high on the shoulder, giving the appearance of a vertical chest.

A concave neck, accompanied by a depression in front of the withers, is often accompanied by a thickened, rounded underline. This is termed *ewe-neck*. Such necks usually result in high-headed horses that have minimal flexion at the poll and are limited athletically.

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## Forequarters

Length of stride, smoothness of gait, soundness of legs and power of propulsion depend on the structure of the forequarters. The front legs carry most of a horse's weight (60 to 65 percent) (Figure 1).

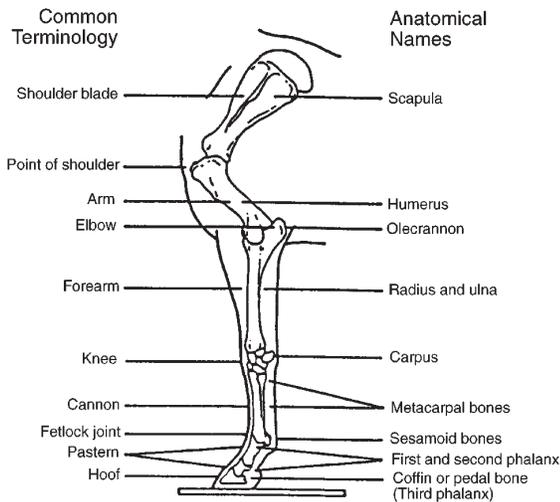


Figure 1. Skeletal Front Leg

The two most critical aspects of forelimb conformation are the 1) slopes and angles of the bones which absorb concussion and 2) the straightness and trueness of limbs so that no one segment receives unusual wear.

Forequarters concussion is absorbed by the unique muscular attachment of the forelimb to the body; the sloping shoulder blade (scapula) and, consequently, the angle formed between the shoulder blade and humerus (arm); the angle between the humerus and forearm; the small bones and tendons surrounding the carpus; the sloping springy pastern; and the expansion and absorption mechanism of the hoof.

**Shoulder** – The shoulder should be long, sloping and muscular. It should extend well into the back. The longer the shoulder, the greater the area for attachment of the muscles that tie the forelimb to the vertebral column.

The shoulder should slope well into the back. This decreases the angle between the scapula and humerus and reduces concussion. A sloping shoulder also provides for free forward motion of the limb by allowing maximum length of stride. A short, straight shoulder reduces stride and increases impact with the ground. A straight shoulder is often associated with a short, straight pastern that further shortens the stride and increases concussion.

**Arm** – The humerus or arm extends from point of shoulder to the elbow joint and should be moderately long. Humerus length is integral to the length of the stride. An excessively short arm, with its

accompanying short muscles, will not advance the forearm enough and the stride will be shortened. On the other hand, a long arm causes excessive wear to the shoulder muscles.

The length of arm should be in proportion to the length of the shoulder and forearm. The length of the arm determines whether legs are set forward or back under the body. The legs should be set well forward.

A long shoulder, short arm, plus long forearm and short cannon allow maximum stride extension.

**Forearm** – Forelegs should be straight and perpendicular when viewed from all directions. The forearm is formed by the fusion of two bones, the radius and the ulna, and extends from the elbow to the knee (Figure 1). It should be long and well-muscled. Forearm length is important in determining stride length.

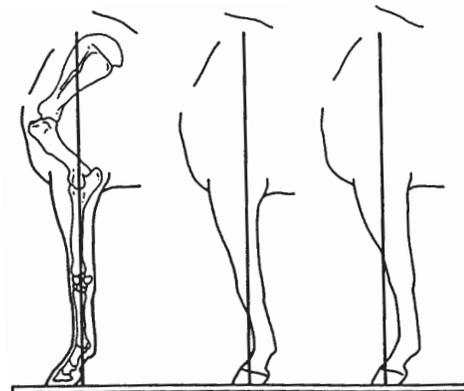
**Cannon** – The cannon should be short and flat when viewed from the side. It should have tight, well-defined tendons set well back to give the appearance of abundant support below the knees. When viewed from the front, the cannon should be centered in a straight, wide, clean knee. Round-appearing cannons and tendons tied in behind the knee are undesirable because they indicate small tendons and lack of support.

**Knee or Carpus** – There are eight carpal bones arranged in two rows. Their function is to bear weight and support the body.

Knees should be straight from both front and side views – wide, deep and squarely placed on the leg (Figures 2 and 3).

### Deviations of Knee Conformation (See Figures 2 and 3)

Buck knee	Over at knee
Calf knee	Back at knee
Knock knee	Knee bends in
Bowlegged (bandy-legged)	Knees bend out
Bench knee	Offset knee, cannon bone not centered



a. Ideal b. Buck-kneed c. Calf-kneed

Figure 2. The Front Legs, Side View

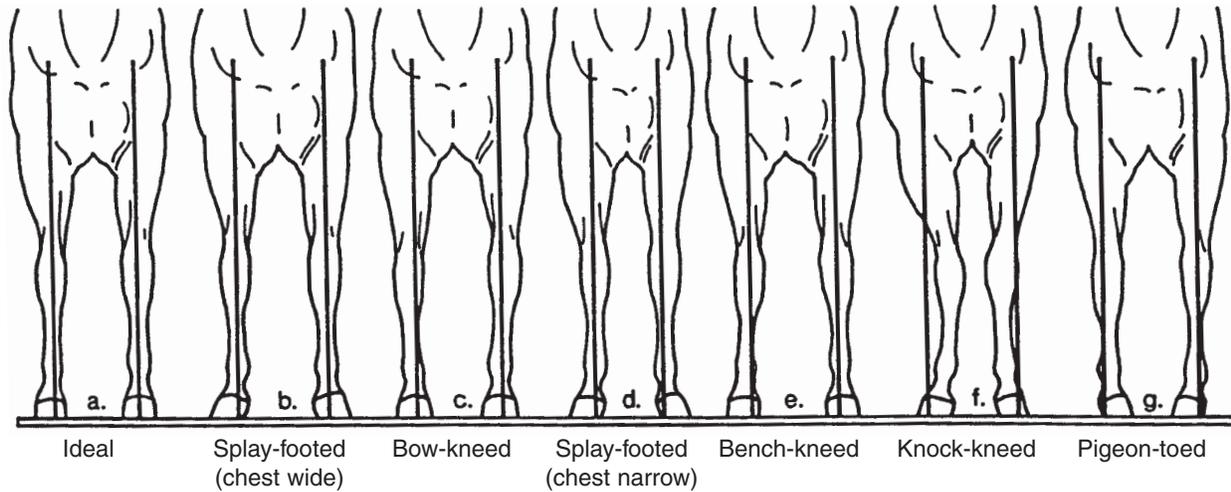


Figure 3. The Front Legs, Front View

**Fetlock** – The fetlock should be set well back on pasterns of medium length that are strong and sloping. Fetlock and pastern together provide springiness to the gait and also disperse concussion. Roughened hair, nicks and scars on fetlock are evidence that a horse hits itself when in motion. The joint should be strong, clean and free from stiffness.

**Pastern** – Both slope and length of pastern help determine smoothness, spring and stride length. A pastern which is too long and sloping (coon-footed) causes weakness because it puts undue strain on the tendons, sesamoid bones and suspensory ligament. On the other hand, a short, upright pastern increases concussion and trauma to foot and fetlock (Figure 4).

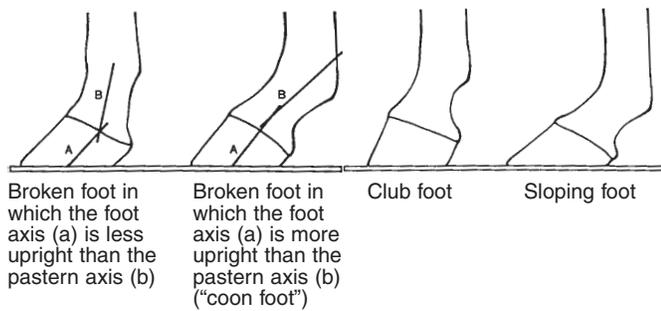
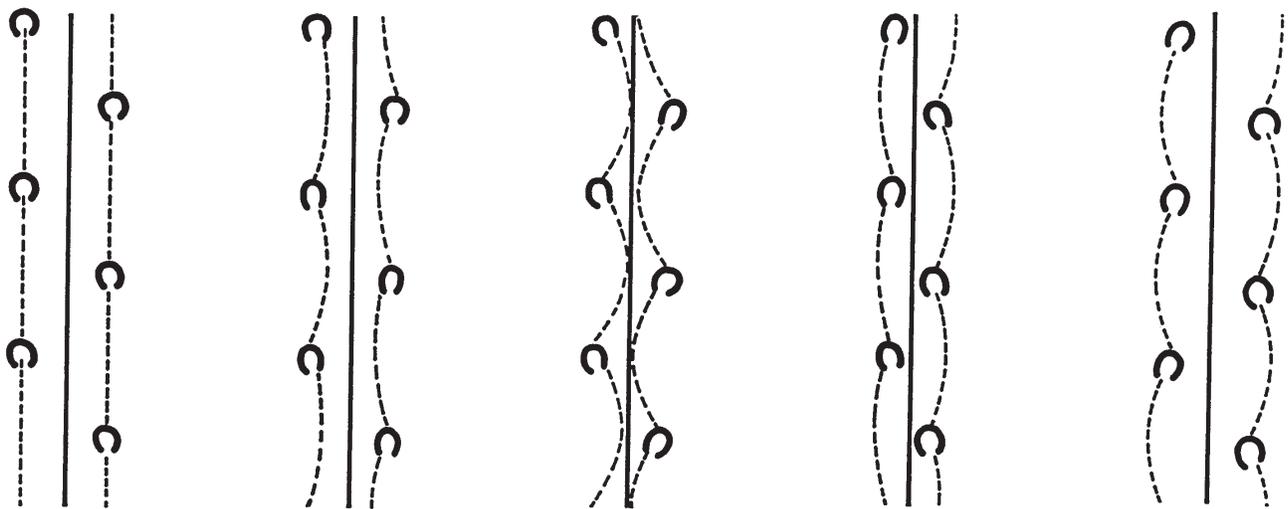


Figure 4. Examples of Abnormal Conformation of Pastern and Hoof

**Deviations of Knee Conformation**  
(See Figure 5)

Base wide	Stands wide at the ground.
Base narrow	Stands close at the ground.
Toe in	Toe pointed inward. This causes hooves to "paddle" to outside of midline when tracking.
Toe out	Toes pointed outward. This causes hooves to "wing in" to inside of midline and may result in the horse hitting itself.



Normal feet move forward in a straight line

Base-wide feet move forward in inward arcs – "winging"

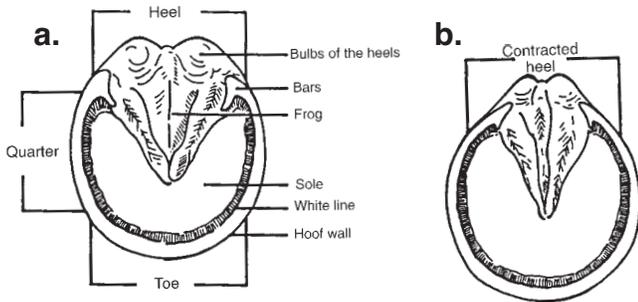
Splayed feet move forward in larger inward arcs – "winging"

Base narrow feet move forward in outward arcs – "paddling"

Pigeon-toed feet move forward in wider outward arcs – "paddling"

Figure 5. Path of Feet as Seen from Above

**Hoof** – The hoof should be in proportion to size of the horse – deep, wide and open at the heel and free from cracks and rings (Figure 6). The hoof angle should be the same as for the pastern. The hoof and pastern angle should not be broken (Figure 4).



**Figure 6. Appearance of a Normal Foot (a) Compared to One With Contracted Heels (b)**

**Review Front Leg** – The forearm ties right into the center of the knee. The knee should be flat and facing straight ahead. The short cannon bone comes from the center of the knee and extends to the center of the fetlock. The pastern should come from the center of the fetlock and drive into the center of the hoof. Any deviation may lead to lameness problems. A line dropped from the shoulder should bisect the foreleg, knee, cannon bone and fetlock and drop 2 inches behind the heel.

**Body**

The body is composed of the withers, thorax and back. Its conformation affects balance, capacity and athletic potential.

**Withers** – The withers is the high point of the horse’s back and is located at the base of the neck between the shoulder blades.

The withers should be prominent and capable of holding a saddle. It should be muscular and well-defined at the top and extend well into the back. The withers serves as a fulcrum over which a ligament attached to the vertebrae in the back and neck acts to help raise and lower the head and neck.

Horses with low, round, thick withers often have rolling gaits and heavy front ends. A flat, mutton withers will not hold the saddle in place. When the withers is prominent, the ligaments and muscles that attach the neck to the thorax move freely and the horse exhibits greater flexibility, coordination and energy in its movement. High, sloping withers with long, sloping shoulders increases the length of muscle in the front end and results in freer action.

It should be emphasized that a prominent withers should be accompanied by muscling, because a thin, over-prominent withers is often rubbed by the saddle and results in stiffness and soreness.

**Thorax** – When viewed from the front, the chest should be wide and deep. A narrow chest indicates lack of muscling and area for the heart and lungs. However, an excessively wide chest forces the legs out, so the gait may be rolling and labored.

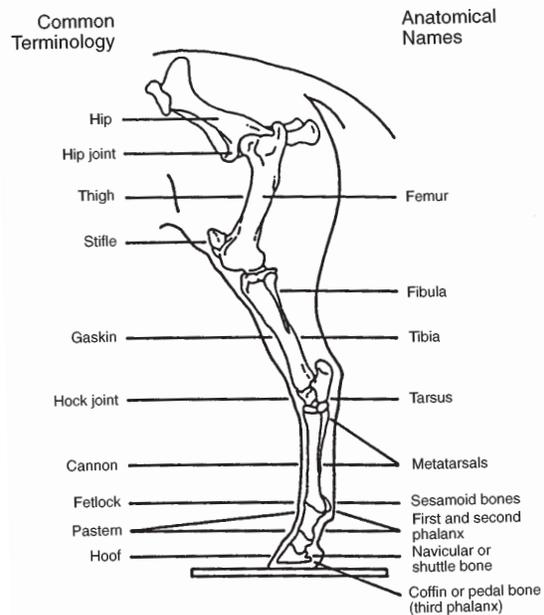
From the side, the thorax should be deep. This region contains lungs and heart and must show capacity. The rib cage provides a base for attaching forelimb muscles as well as protecting the vital organs. When the ribs are arched and project backward, it is possible for the horse to have a long, deep chest and underline and still have a short, straight, strong back.

Short, flat, straight ribs decrease the lung area of the horse and reduce athletic potential. These horses are termed *slab-sided*.

**Back** – The back extends from withers to loin or last rib. It should be short, straight, strong and muscular. Avoid a sagging or swaybacked horse. Many horses with long backs become swayback with age if not properly conditioned.

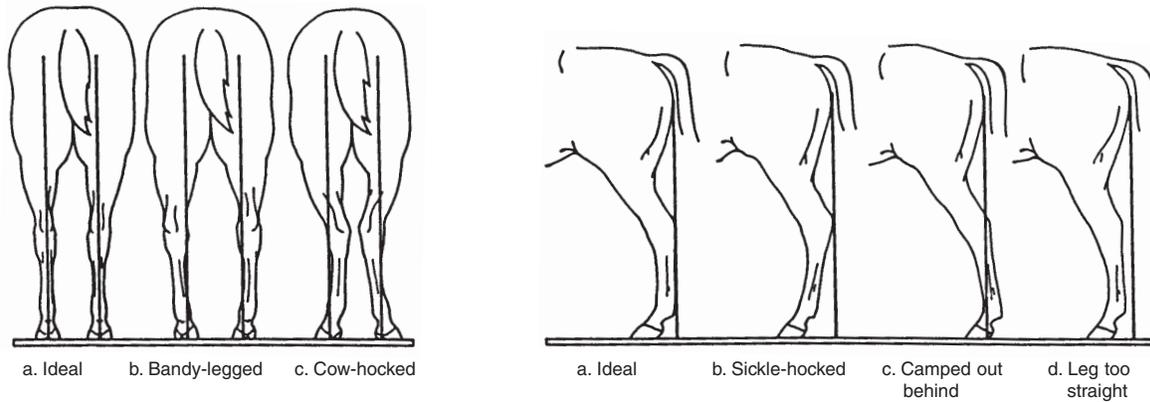
**Hindquarters**

The conformation of the hindquarters (Figure 7) will have a dramatic effect on athletic ability because of their importance in propelling the horse forward.



**Figure 7. Skeletal Hind Leg**

**Croup** – The slope of the croup has a strong correlation with the function of the horse. Long-distance or endurance horses have a level croup. Short-distance, speed horses have a slightly sloping croup. A very short, steep croup is associated with straight hind legs or post legs and predisposes the horse to concussion injury in the hock. When the horse stands under behind and the angle of the hocks



**Figure 8. The Rear Legs, Rear and Side Views**

places undue strain on the hind legs, particularly the plantar ligaments, the horse is said to be sickie hocked. Sickie hocks can lead to unsoundness called *curb* (Figure 8).

**Femur** – The femur should be short with the stifle pointed slightly outward so there will be a full range of movement for the hind legs. If the femur is carried too far to the rear, the legs are carried too far backward. This is called *camped out*. If it is carried too far forward, the legs are brought under the body. This is called *camped under*.

**Tibia** – The ideal horse has a long tibia (gaskin) and short cannon with low-set hocks. This allows the horse to work off of its hocks and provides the maximum stride extension.

**Hock** – If the hock is raised and the tibia shortened, cushion is reduced and performance can be limited. The hock should be clean, having no soft tissue swelling or bony projections. It should be well-defined and powerful.

The angle of this joint should allow the hind leg to extend and flex during motion and offer the least amount of stress to this column of bones.

#### **Deviations of Hind Leg Conformation (See Figures 8)**

##### **Post-Legged**

Post leg is upright, which causes concussion in hock, predisposing stifle problems and bone spavins. Pounding breaks down the lubricating fluid in hock.

##### **Sickie-Hocked**

Wears joint out from fatigue. Reduced stride. Places stress on plantar ligaments in rear of hock.

##### **Cow-Hocked**

Close at hocks. Toes point out excessively. Stress on outside of hocks.

##### **Bandy-Legged**

Wide at hocks. Bowlegged. Rotates hocks in a grinding motion.

**Pastern** – The pastern of the hind legs may be slightly longer than the front pastern and will slope at a greater angle.

**Hoof** – The hoof of the hind legs is sloped, slightly more than the forefoot (Figure 7). The angle of the hoof and pastern should be equal.

**Review Hind Leg** – A plumb line dropped from point of buttocks should touch rear border of the hock, run parallel to cannon and strike the ground 3 to 4 inches behind the heel. From the rear, the line should bisect hock, cannon, pastern and heel (Figure 8).

## **Muscling**

Muscle is the powerhouse of a horse. It also adds support to the horse's skeleton and strength to its joints. Judge muscling by length, thickness and distribution. Look for long, smooth, well-defined muscling. Everything about the muscle structure should reflect speed, power, endurance and athletic ability.

**Neck** – Muscling in the neck should be long and lean.

**Chest** – Muscling in the chest should be prominent and have a well “V-ed” appearance, particularly in stock-type horses.

**Arm** – The arm should be heavily muscled for strength and support.

**Forearm** – The forearm should show prominent muscling that ties in low and flat on the knees.

**Back** – The back carries the weight of the rider. It must be moderate, strong, straight and muscular. Back length must be moderate. If it is too long, the back will be weak, and if it is too short, there may be overriding or interference of the vertebrae of the back.

**Loin** – The loin, or coupling, connects the thorax with the powerful propulsion muscles of the hind limbs. The loin transmits power to the forequarters, so it must be short, wide, strong and heavily muscled.

A horse that is weak in coupling and shallow in the flank is termed *hound-gutted* or *wasp-waisted* and lacks drive. Do not be misled by a highly conditioned horse that is well tucked up.

**Hindquarters** – The hindquarters are the engine of the horse. The main role of the hindquarters is to provide the force for propulsion. Look for the three dimensions:

- **Length** of croup (loin to tail)
- **Width** from stifle to stifle
- **Depth** from top of croup down through hock

Croup should be long, uniform in width, muscular and evenly turned over the top. Muscle length is associated with speed and endurance; width is associated with strength or power. Measure length of croup from the point of the hip to the point of the buttocks.

**Hind Leg** – The ideal horse has long, smooth, prominent muscling through the thigh, stifle and gaskin. Thigh muscles are the most massive and powerful in the horse's body. The stifle should be muscled so it is the widest point in the hindquarters.

The gaskin should be long and well-muscled. The length from the croup to the hock is associated with speed and desirability in form. A long gaskin ensures a maximum range of action and provides maximum area for attaching the hindquarters drive muscles. A short gaskin decreases length of stride. Gaskin muscling should be well-defined, broad, wide, deep, and tie in low and flat on the hock.

## Quality

Quality is the degree of refinement of hair, skin, bones and joints. The mane and tail should be full, and the hair should not be coarse or rough. Excess hair at the chin, throat, ears and legs indicates a lack of quality.

Refinement of the skin results in a thin, pliable skin under which tendons and blood vessels can easily be observed. A thickened, puffy appearance in the head and soft, round cannon bones may indicate coarseness in the horse.

## Type

Type describes a set of characteristics for a breed or athletic purpose for horses. Some characteristics of several breeds or athletic uses are listed below:

**Arabian** – Beautiful heads; large round eyes; broad forehead; dished face; fine muzzles; head set neatly on a well-arched neck (swan shaped); flat croup; legs refined, showing quality, appearing flat with tendon definition; pastern slightly more sloped, providing a springy stride; moves with animation, presence and the tail is carried in the air – straight.

**Hunter** – Deep chest and spring of rib indicating capacity; long, smooth, powerful muscles throughout body; head relatively short and straight; clean in the throatlatch and long, slender neck; quality and soundness of underpinning is a must for the hunter; an exceptional mover with long, ground-covering strides.

**Stock Horse** – Head reflects alert intelligence; short head, broad between the eyes and small, alert ears; jaws massive – spread wide apart giving the impression of great strength; back short, close coupled; smooth, prominent muscling in chest, forearms, back, loin and hindquarters; muscling is distinctive and easily recognized; moves out freely with ground-covering strides.

## Travel

The horse should travel balanced within its frame and move with long, ground-covering strides. See travel terms below for more detailed discussion.

### Travel Terms

**Rhythm** – Regularity of footfall or period of footfall.

**Tempo** – Speed measured in meters per minute.

**Cadence** – Rhythm and impulsion give the gait an energetic lifting of the feet.

**Impulsion** – Created by closing the hip joint which engages hocks under the mass of the horse. This allows the horse to cover more or less ground according to the energy of limb extension.

**Collection** – On the bit, hocks under him, head flexed, full control over limbs, jaws relaxed, ready to respond to rider. Collection is not tense, imposed position, but relaxed, elastic one.

**Free Walk** – Relaxed pace; lower head; stretched neck is relaxed.

**Collected Walk** – On the bit; moves forward; neck raised/arched; head approaches vertical; light contact; shorter steps.

**Extended Walk** – Hind feet touch ground clearly in front of front feet; stretches head and neck.

**Working Trot** – Between collected and extended; not ready for collected movements; on bit; even, elastic steps; good hock action.

**Collected Trot** – On the bit; neck raised and arched; hocks well engaged; maintain energetic impulsion; shoulders move with ease; shortened steps.

**Extended Trot** – Horse covers as much ground as possible; maintains rhythm but lengthens steps because of impulsion from the hindquarters.

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