

# The Design of the Horse



Often, we are presented with a horse in some degree of distress that requires us to focus upon one organ; one body system to start repair and healing of that distress. Most other times, it serves us well to consider the horse as a group of interactive systems working as a whole.

A single glitch in one part will affect other parts and good health in one will help support good health in others.

The skeleton is a structure of great complexity that is the armature onto which the rest of the physical body is attached. The bones are made of minerals (supplied by the diet) and are not static. This means that if other body systems require a mineral that is not being given sufficiently in the food (such as calcium for a gestating or lactating mother), the bones will release the mineral into the bloodstream.

Flat bones protect vital organs. Long bones support the body. The tail (part of the complex spine) is a barometer of how the back feels. Tightness on one side of the tail generally indicates which side of the back is sore. The ribs are considered "true" when they meet and are attached and "false" when they are separate.

A joint is a moveable union between two or more bones. Articular cartilage covers the surfaces between bones and synovial fluid (formed by a membrane protected by the capsular ligament) lubricates the unions to reduce friction. Horses' long bones in the legs are not fully formed until the age of 3 ½ years. The equine spine does not calcify until age 6!

The circulatory systems are the delivery routes for nutrients and oxygen and the excretory routes for toxin release. Blood is composed of red blood cells (convey oxygen) and white cells (defense and healing organisms) floating in serum. Arteries take blood away from the heart and have no valves. Veins bring blood back to the heart and have valves. The heart is the master pump maintaining life's rhythm, while the horse's hooves and legs work as circulatory assist in the simple act of moving around.

When blood reaches capillaries (minute vessels connecting the smallest arteries and veins), the serum oozes through their walls and becomes lymph. It nourishes tissues and takes up worn out materials. The spaces assemble into vessels of their own (lymphatics). Through them flows surplus lymph full of waste products. Glands separate substances in the blood to be used by the body or excreted as waste. Lymphatic vessels pass through lymphatic glands, which act as filters. Lymph is moved through the body by external massage, stretching and exercising. These are profound reasons to keep horses active at all times possible.

Respiration is a remarkable kind of alchemy where oxygen is taken to the bloodstream and waste/carbon dioxide is expelled. Our horses cannot breathe through their mouths, so their nostrils must remain open and lungs healthy to keep the blood oxygenated. Horses require air flow when in buildings. They create large amounts of exhaled moisture and air exchange is vital to good health.

The mouth is the first organ of digestion. The horse has incisors at the front of his jaw used for biting off pieces of grass. In the back of the jaw are molars used to grind his food in "mastication" and mix it with saliva. The horse's teeth continuously become longer by "erupting" (they do not grow, there is a limit to the amount of tooth through a lifetime) and we can determine age by the shape, condition and length of an equine's teeth.

The esophagus of the horse prevents vomiting – everything he eats must pass all the way through a long and turning system. His stomach is small and food passes

through it quickly. Only about 10% of his digestion occurs in the stomach. Its capacity is about 3 gallons. The small intestine and large intestine are where the predominance of digestion occurs and are lined with villi which absorb nutrients from food. The hair-like villi are more numerous in the small intestine than in the large. The abdominal cavity is lined throughout by a protective membrane called the peritoneum. Horses do not have gallbladders. Bile salts are secreted constantly into the small intestine by the liver. The horse's liver performs many functions including secretion of bile, storage of fat-soluble vitamins and as a filter to eliminate toxins (paired with the kidneys that regulate fluid and filter out proteins, salts and toxins).

When we think of the horse's systems of nourishment and elimination as a well connected, interdependent design, we can see how to support their proper functioning with clean air, simple natural foods, pure water and daily exercise. It is the cumulative effect of proper management that assures good health and the cumulative effect of neglect that creates disease.

Muscles are voluntary (neck, legs, tail, etc.) and involuntary (heart, intestines, etc.). Muscles form about 50% of the weight of the equine body. They are long (found in limbs), wide (stretched beneath skin) and short (around irregular bones). Tendons are round or flattened cords attaching long muscles to other structures. Ligaments are strong bands of inelastic tissue used to bind joints together.

A muscle never works as a sole unit, think of your horse as a whole. Static work fatigues muscles rapidly (think of how it feels when you hold up a box in one position and your arms start to ache), active work assures circulatory assistance.

Our horses are creating their physical bodies each day using the foods and water that they ingest, the air that they breathe and the use of their musculature in exercise and stretching. When we provide for them an environment that is as

close to a natural condition as possible, we give them the best chance for building strong and healthy physical bodies.

