

INTRODUCTION

The horse is a highly sophisticated living organism made up of atoms, molecules, cells, tissues, organs and systems. To enable him to reach his full athletic potential and give him a happy, healthy quality of life, it is up to us as carers, riders, trainers and therapists to ride him sensitively, manage him effectively, and give him the best possible chance to succeed. To do this, it is important to understand both his capabilities and limitations within the context of his structure and function. This book looks at the practicality of anatomical training. Each anatomical system has individual tasks to perform but is also interdependent on the others.

The **Skeletal System** provides the rigid framework, the skeleton, which supports and protects the body and provides anchor points for the muscles.



The **Muscular System** consists of the muscles, tendons and fascia responsible for creating movement of the skeleton and internal organs.



The **Integumentary System** is the outer shell and consists of the skin, coat, hooves, mane and tail.



The **Nervous System**, consisting of the brain, spinal cord, nerve fibres and nerve cells transmit electrical messages and is the control and communication mechanism for the body.



The **Endocrine System** controls growth and internal co-ordination by using hormones to transmit chemical messages via the circulatory or lymphatic systems.



The **Respiratory System** takes air and oxygen into the lungs and removes carbon dioxide from the body.



The **Cardiovascular System** distributes blood around the body via the heart, veins and arteries supplying it with nutrients and oxygen and defending it against disease.



The **Lymphatic System** filters the tissues, removing tissue fluid, waste products, bacteria and broken cells. It is closely involved with the circulatory system and aids immunity by fighting infection.



The **Digestive System**, the digestive tract, stomach, intestines, pancreas and liver breaks down and process food to enable it to be absorbed and used for energy and cell nourishment.



The **Urinary System**, consisting of the kidneys, bladder and urethra, collects and eliminates water, urea and other waste products from the blood. It is strongly involved in hydration control.



The **Reproductive System** is the smallest system and consists of the ovaries in the female and the testes in the male.



SPINAL FLEXIBILITY AND BEND

It is the rigidity of the back and the interlocking configuration of the vertebrae that allows the horse to support the weighty hindgut and carry the rider. Optimising the small amount of back movement while maintaining strength and stability is the key to keeping the horse supple, improving performance and reducing the risk of tension and strain within his back muscles.

Longitudinal Bend.

This is either spinal flexion or extension. Flexion involves the horse lifting and rounding his back and it occurs when he works either in a long and low outline or is correctly 'through' and 'on the bit'. Spinal extension, the opposite of flexion, occurs when the horse hollows his back and raises his head and tail (pictured). This posture is commonly associated with tension and the fight-flight response.



Longitudinal suppleness is required for the horse to have the flexibility and range of movement to perform engagement exercises in dressage, jumping and western riding movements, such as the sliding western halt.



Lateral Bend.

The horse does not bend evenly from poll to tail. Most lateral or sideways flexibility occurs within the neck and tail with only one to two degrees of bend occurring within the joints of the lumbar and thoracic vertebrae. The small amount of bend that does occur in the back mostly takes place in the caudal thoracic region right underneath the back of the saddle. The ribs also contribute to lateral flexibility by coming closer together on the inside of the bend and further apart on the outside and this gives the feeling of the horse 'bending' around the inside leg. When performing small circles or lateral work, the horse uses bend through his back and ribs.



Within the horse's spine, the most inflexible part will not bend until the most flexible part has reached its end range of movement. Where the neck is taken only to the mid range of lateral movement, (picture 1) very little bend occurs in the mid spine region. Where the horse is really reaching round for the carrot, taking the neck towards its end range of lateral movement (picture 2), some bend can be seen in the thoracolumbar vertebrae. Note the movement of the ribs in these photographs.



THE RESPIRATORY SYSTEM

Respiration is the act of inhaling and exhaling air. Oxygen is vital for life and cells need a continual supply to enable them to release energy from food. For an equine athlete to provide sustained performance, blood must assimilate oxygen from the lungs and transport it efficiently to the muscles. This is an important consideration in how we manage, condition and train our horses. Basically, the more efficient this process is, the more stamina the horse will have and the more mentally alert he will be.

The respiratory system consists of:

- the upper respiratory tract – the nostrils, nasal passages, sinuses and larynx
- the lower respiratory tract – the windpipe (trachea), lungs, bronchi, bronchioles, and diaphragm

